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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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THE Second Annual National Mining and Industrial Exhibition was opened at Denver, on the 17th, with much festivity.

THOMAS COUCH, of Salt Lake, Utah, one of our most experienced and reliable mine foremen, is at present at Butte City, Montana, where he may be addressed for a short time. He offers his services either to examine or to manage mines.

OUR correspondent, "Specular," who closely follows developments in the great Lake Superior District, this week discusses the present condition and the prospects of the ore mines. He states the condition of that great industry frankly, as he finds it ; but he does not by any means give encouragement to those furnace-men who believe that all they need to do is to wait in order to obtain their supplies of raw material at their own figures. On the whole, his view is not as gloomy as that of Mr. JAMES M. SWANK, who, in a letter to the *Bulletin*, dated July 6th, says : "From the best information that we could obtain, we came to the deliberate conclusion that this year's production of iron ore in the Lake Superior region will not materially exceed one half of the production of last year : it will certainly not reach two million tons."

THE "boom" for which the members of the Metal Exchange have gradually been getting into shape has come, and pig-iron and tin have been chosen as the favorites. With a plethoric treasury, $65,000 being in bank, and a large number of members who have had ample experience in bulling and bearing cotton, petroleum, grain, and stocks, a lively time may be looked forward to for a while. The Metal Exchange is established on a firm basis, and is bound to become an important element in the trade. It is useless to discuss whether it is a desirable factor or not. Its existence can not be argued away or its members be frowned down. In the metals, it has a field of considerable promise, so far as concerns the magnitude of the business which may come to it. Tin has been the foot-ball of speculators on both sides of the Atlantic for years, and has naturally promptly assumed a prominent *rôle* at the Exchange. Lead has almost annually felt the results of speculative dealings, and spelter has been repeatedly touched in the same way. Years ago, copper was quite a favorite metal with outsiders ; but the unwavering policy of the Calumet & Hecla Company, backed by its great power, so thoroughly discouraged the speculative element that for a long period it has been entirely absent. The recent great increase in the product, distributed among a number of producers, would appear to create opportunities, and it does not seem impossible that in the future we may witness speculative manipulation simultaneously on both sides of the Atlantic.

Pig-iron and old material have seen periods of wild speculation by outsiders in this country. We need only point to the boom period, when, notoriously, merchants and capitalists of all classes "plunged" deeply ; but we question whether any thing approaching in magnitude the Scotch warrant market can ever be built up in this city. In other branches of the iron trade, there is little room for speculative maneuvers. Such is briefly the field, so far as we can survey it, of those who have begun to deal in futures in the Metal Exchange. That the introduction of this means of creating business is capable of doing some good, and a good deal of harm, those in the trade will be ready to admit. There is a powerful opposition to it ; but those who dread its influence will not be wise if they sit quietly by. It will undoubtedly divert some business from other cities to New York, and from other channels ; but we question whether in times of ordinary activity the general public will do much toward its support.

THE INDIAN GOLD MINING INDUSTRY.*

During the past few years, Americans have been so busy here in endeavoring to save from the general wreck the more meritorious mining ventures floated during the period of speculative excitement that they have had little time or disposition to watch the course of events abroad. There was little that was consoling in the fact that, while they were struggling in the trough of the seas, enthusiastic British investors were giddily riding on the foaming crest of a huge wave. The history of the Indian gold mining excitement, which Mr. D. E. W. LEIGHTON has written in a clear, critical manner, furnishes a striking illustration of the dangers into which mining is carried. It is instructive because it is, we believe, the first instance in which the distribution of the funds invested by the public is made known. The Indian gold mines have been an extreme case, and have been paralleled in this country only in a few instances ; but the manner in which they were floated in the English market is, unfortunately, only too often repeated. Mr. LEIGHTON distributes the blame for the swindles perpetrated and the errors committed pretty uniformly, and does not spare the dear investing public, for which so many display tender sympathy and echo unbounded indignation after it has awakened to its folly, while few are willing to assume the thankless task of warning and advice.

The first one of the mines of the Wynaad and Kolar districts was put on the London market in December, 1879, and in rapid succession others followed until within nineteen months forty-one companies had been formed, of which thirty-three, having a nominal capital of twenty millions of dollars, proceeded to allotment. The interest in this class of ventures made it possible to carry values near par, and in many cases far above it, until in July, 1881, after a month of the wildest boom, the bubble burst. Out of the thirty-three companies, fifteen have until now passed through the hands of the liquidator, the majority of them probably never having done a stroke of mining work. Nearly all of the rest of them may be supposed to have been actually formed with the object of extracting gold from the ores supposed to exist in the Wynaad and Kolar districts. These eighteen companies, according to Mr. LEIGHTON, have a combined capital of £2,682,500, of which £306,000 is still left unspent in the treasuries of the companies : £1,546,500 may be set down as the amount of money paid for the properties, and £130,000 as the capital uncalled for, or calls not paid in, leaving as the money actually spent £700,000. Of this sum, it is estimated, not less than £194,000 was expended for law charges, directors' fees, agencies, and traveling, thus leaving only £506,000 as the amount actually laid out in plant and development-work, the former calling for £338,000 and the latter for £168,000. The vendors and promoters of the Indian gold mines got £1,195,000 in cash and £1,297,000 in shares, a part of which, we presume, they realized on. These are hand-

* THE INDIAN GOLD MINING INDUSTRY, ITS PRESENT CONDITION AND ITS FUTURE PROSPECTS. By D. E. W. LEIGHTON. Madras : Higginbotham & Co. 1883. 8vo, 70 pages ; with Appendix, xxii pages.

some figures for mere prospects and exhausted coffee estates; but they would be comparatively insignificant, if, in the wide territory covered, there were proved really gold deposits of magnitude and permanence. Unfortunately, the millions spent thus far in machinery and development have not even given assurance on that point. Up to the close of 1882, there have been crushed 3901 tons of quartz yielding 536 ounces of gold. Mr. LEIGHTON urges, and no one acquainted with mining operations will deny the force of his argument, that it is impossible to bring an industry such as the extraction and treatment of gold ores to full working order within as brief a period as the impatience of directors and stockholders generally expects, especially when the mines are located in an inaccessible region, like the Wynaad, which is 30 or 40 miles from the coast, with an ascent of 3000 feet. BROUGH SMYTH, who first drew attention to and fully described the district, undoubtedly underrated these difficulties. But making full allowance for this fact, it must be humiliating to those engaged in the district to confess that after two years' work they know little or nothing more of the deposits than when they began. Mr. LEIGHTON does not acknowledge this in so many words, but it may clearly be read between the lines. He deplores that so much money, comparatively, was expended for machinery, while so little was done in the mines, and winds up his review with the statement that "it may be said with some confidence that the time is now near at hand, when, in the Wynaad, at any rate, the existence or non-existence of gold in paying quantity will be an established fact." We sincerely hope that the next monsoon will furnish the proof, and that then Indian mining companies will take the sound advice which Mr. LEIGHTON offers. The money wasted will then at least have been spent to some purpose, in acquiring, though at a fearful price, experience.

DAVID DUNCAN.

In the death of Mr. DUNCAN the coal trade has lost one of its most distinctive representatives, one who spent his entire life in the business, having been an active participant in the wonderful development of the industry from its small beginnings to the colossal proportions of to-day. He bore a varied, an extensive, and an honorable part in all its different relations.

Mr. DUNCAN was born in Scotland in 1813, and while yet an infant his father emigrated to this country, and as early as 1820 was engaged in the coal business in Philadelphia, where the deceased found his first employment as a boy in his father's yard. At the age of twenty, he went to Schuylkill County, and was identified with MILNES & HAYWOOD throughout their entire mining career. Subsequently, he went to Philadelphia, and took charge of the Port Richmond shipping-docks, whence he returned to Schuylkill County as weigh-master for the old Schuylkill Canal Company at Mount Carbon. He then engaged in mining operations, whose vicissitudes finally landed him in New York, where he remained in the wholesale coal trade up to the time of his death. Known and respected by all, Mr. DUNCAN filled a conspicuous place among his contemporaries. Without having had the advantages of an academic course, he accumulated a large and varied fund of information. In business, he was conservative and methodical, being governed by the strictest commercial rules, but above all by a strong and unswerving sense of honor. In manner, he was singularly unobtrusive, genial, and kindly; but in argument or maintaining what he thought the right, he was bold and tenacious. His domestic life was a poem. Surrounded by a large and loving family, he sought no diversion outside the sacred circle upon which his whole affection was concentrated, and which he saw bloom into the third generation before he passed away. A man of broad and liberal interpretations, he was of deep religious convictions, and the sweet serenity with which he faced the fell destroyer beautifully illustrated the symmetry of his life.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Zinc-Blende and Galena in Pyrites Deposits.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My attention has been called to a communication written by H. J. Davis, of Charlemont, in your issue of May 19th, 1883, in which he assumes that Mr. Whitmore is in error in making the statement "that on top of pyrites deposits are usually found zinc-blende and galena." I have had the management of the Cotopaxi and Saltiel groups of mines at Cotopaxi, Fremont County, Colorado, since early in 1879, and have found that the large vein of cupriferous pyrites ore running through both properties is covered by a strong vein or seam of zinc-blende, followed on its hanging-wall by a large vein of pyroxene rock bearing galena. The ores are contained in fissures, almost vertical, and have a granite country-rock. In other localities of Colorado, I have noticed the same accompaniments to the deposits of chalco-pyrites. Yours truly,

NEW YORK, July 16. E. H. SALTIEL.

THE OUTLOOK FOR THE LAKE SUPERIOR IRON MINES.

Special Correspondence of the Engineering and Mining Journal.

The iron ore miners of the peninsula have at last awakened to the poignant reflection that, if they wish to send their products to market at all this season, they must begin to make hay while the sun shines. Up to the glorious Fourth, the shipments for 1883 exhibited a falling off of 440,000 tons from the corresponding time of last year, when the total consignments of Marquette and Menominee ores had reached a long mark over a million tons. Of course, it is understood by all that the adequate cause of this falling-off was not any deficit in actual and possible supplies of material, but the cadaverous condition of the market. Producers have listened attentively for invitations to send down their ores ever since the new year opened its eyes; but what little they have heard, with a few trifling exceptions, has been little else than the merest badgering. The highest grades of Bessemer have gone begging. Only yesterday, your correspondent had word from one of the largest rail plants in the West, that no ores need apply in that market. No sales have been made to speak of, outside of concerns which have found it very convenient to offer their wares for what they would bring. It was asserted, early in the season, that the Republic had sold; but the author of the story was color-blind as regards the truth, and that, too, for a purpose. Rumors have often been afloat of large sales, the last being the report that the Cleveland has contracted for the delivery of 90,000 tons, and the Republic for 75,000; but such rumors, as a rule, are simply chewed air. Generally speaking, the mines are as saleless as in January or February, and the hope that is said to spring eternal in the human breast is now turning into the gall of bitterness.

In the mean time, the mines have accepted the grim logic of events by restricting output and curtailing every possible expense. The Republic has lately excused 375 men, and is now working only one shift. The Lake Superior has discharged no less a number, and is doing practically no stoping at all. The Champion has discharged 250 men, and, with the exception of the Barnum, the other mines of the Marquette District, as well as those of the Menominee, have followed a very strong suit. The Champion, I am credibly told, is working but four machines in its whole property. The Milwaukee, of the Negaunee hematites, has closed down rather than pay royalty, and the greater part of the mines are carrying few if any stopes. Some, of course, have not abandoned stoping; but as a rule, these are concerns which must either pump hard or drown altogether. These do not cut any marked figure in our peninsular totals. Several extraneous enterprises, such as the railroad to Copperdom, and the short one from Copperdom to Lac la Belle (the locomotive for which, a heavy Baldwin, passed up last week), have swallowed up considerable of the floating labor; but multitudes of miners, true to their traditions, have drifted into other and distant parts.

Nevertheless, ore has constantly been dropping down to lower ports, despite the stagnant market. It was natural that the Republic should employ its fleet of barges and schooners in transporting its ore. Other mines have had to ship enough to fill their contracts with vessel-owners; and very lately, there seems to be a general suspicion lest a big fish or two should swallow the whole market by being on hand in Cleveland in time of need, and quite a number, therefore, have begun shipping in dead earnest, though the raw material is as yet unsold. This in part accounts for the activity that has been developed in the past two weeks. And yet there is no reason to think that prices for ore will be slaughtered, even though they are deposited in the enemy's country. There will doubtless be sharp competition, and the companies are willing to part with their products at a reasonable margin, the Goliath of Gath having freely offered its specular for $6.50 which sold for $9 last year; but the companies have altogether too stiff a spinal column and too heavy an exchequer for the furnaces to imagine for a moment that they will give their ores away. It is quite probable that a few thousand tons may be sold by shaky companies for what the iron-mongers have a caprice to pay; but this disturbing factor will be transient and of little consequence. The profits of the past will prevent any general collapse approximating to a panic. No one apprehends a collapse here, and those who are best informed are most buoyant. Perhaps a few quotations of ruling prices per ton for ores would be interesting:

Quality ore.	1883.	1882.
No. 1 Bessemer, specular and magnetic	$7.00@$8.00	$9.00@$10.00
No. 1 Non-Bessemer, specular	5.50@ 6.50	8.00@ 9.00
Bessemer hematites	4 75@ 5.25	7.25@ 8 00
Non-Bessemer hematites	4.25@ 5.00	6.00@ 6.50
Menominee ores	5.50@ 6.75	7.00@ 8.50

It is quite probable that these figures include the limits of all important sales, if, indeed, any sales thus far can be said to be important, though the lower range of figures is the one for the most part contracted on.

The surface reason why so much unsold ore is now going below is competition between the mines, as already outlined. But there is another reason for sending these large blocks of ore down, which is far deeper. It is: If our peninsula people would retain their lion's share of furnace traffic, they must have their ores within easy reach of the furnace district; and the shipping season is fast wearing away. As it is, the lake mines have always held a strong grip on the steel and iron producers. Of course, it is silly to think that Lake Superior pig will be easily supplanted, or that the furnace-men, remembering past figures which they paid for Republic, for example, will retaliate as soon as any possible opportunity offers itself by letting us up here severely alone. But it remains true that Lake Superior iron men can not afford to be too unconcerned and indifferent, as they would certainly be if they were to hold their immense blocks of ore in their distant stock-piles, because buyers had not been forthcoming in the early months of the year. To keep the ore at home would be to turn the market over in the fall, winter, and spring to the lean producers of Pennsylvania, New Jersey, Vermont, and the South, to say nothing of the West and the new Northwest. And our people might possibly find out that this was a dangerous experiment.

What ought to be done, first of all, is to compute what share our lake properties have in the annual output of our American mines; and after that, ascertain what are the probable limits of demand until another season, and then, by inference, how much ore can be safely sent down this summer from our northern mines. Concerning each of these, it is

only possible to speak with approximate correctness, since many of the data are, for reasons, sequestered. If we follow the advice of Captain Cuttle, however, and "make note of" what significant facts are at hand, we can get bearings sufficiently accurate to outline plans and predict results.

For the past few years, only enough ore has been in furnace-yards during the winter to carry the furnaces over until the opening of navigation, and has been, for this reason, a more or less constant quantity. The product of ore for any year, therefore, may be approximately reckoned by computing the ore requirements of the pig and blooms made in that year, and subtracting therefrom the tons of ore which were supplied by importation. The amount of pig cast in American furnaces during 1881 was 4,641,564 net tons of 2000 pounds. The amount of blooms made directly from ore were insignificant, probably not exceeding 50,000 net tons. Taking into account the lean ores of Eastern and other districts, it is safe to say that the ore required would not fall short of 7,000,000 tons. The importation of ore for 1881 equaled something over 850,000 tons, leaving 6,150,000 tons as the aggregate requisition made upon American mines. To supply this demand, our peninsular mines sent down a round 2,320,000 tons, or a trifle over one third of the whole amount. There are no definite data by which to outline the amounts supplied by other sources, although Mr. Swank gives a few statistics as follows: New Jersey, 737,000 tons; Champlain District, 637,000 tons; Lebanon District, 250,000 tons. During the year 1882, our domestic furnaces turned out 5,178,000 tons of pig and perhaps 50,000 tons of blooms from ore. This could not have been done on less than 8,100,000 tons of ore. Of this amount, some 590,000 tons came from foreigners, leaving 7,500,000 tons to be blasted from domestic mines. To supply this increase, our lake people again came to the front with 2,950,000 tons, or, as in 1881, a trifle over one third of the aggregate domestic supply. Mr. Swank's figures exhibit a like increase in the districts above named, New Jersey furnishing 900,000 tons; Champlain, 675,000; and Lebanon, 400,000.

It is evident, from these figures, that the lion's share of furnace trade has been held by Lake Superior companies. It is evident, moreover, that any encroachment on this lion's share will be firmly held, if it be at all possible, by those who make the encroachment, since the developing of properties, construction of plants, shipping facilities, and the like will give these persons a grip on the market which will be shaken off with supreme difficulty. A period of indifference on the part of lake iron men will place them in the predicament now rattled around in by lake copper men, who, oblivious of the ambitious aspirations of Arizona and Montana miners of black copper ore, held on their course until the Western striplings at last threaten them with ruin. This may be, probably is, a little rhetorical; but yet it contains food for solid reflection. There was no other course for the Michigan mines to pursue than to send down at least enough ore to maintain their hold and influence upon the iron-mongers of the country. A process of restriction, as has already, and in former letters, been set forth, is going on at the mines; but it would be most subversive of self-interest to hold all unsold ore at home, lest, while we are waiting, another's shears clip off the golden fleece. The mine-owners of South Wales, Lancashire, and Cumberland can do what we can not do, since the furnaces which melt their ores are under their very noses, and their mines are never, like ours, locked out of the market by a long and expensive winter. They must not be our examples. We must be a law unto ourselves.

SPECULAR.

A VISIT TO LEADVILLE.

Special Correspondence of the Engineering and Mining Journal.

To the lover of grand and majestic scenery, a journey from Denver to Leadville, via the Denver & Rio Grande Railroad, is a treat not soon to be forgotten. Nothing could be grander than the Grand Cañon of the Arkansas, and no visitor from the East should miss seeing it.

Arriving at Leadville, all was hurry and bustle, and trade was very brisk, as the mines were all making their monthly payment of wages. Harrison avenue is filled every day with busy people, hurrying to and fro; while in the evening, the foot-walks are almost impassable from the crowd of toilers, whose day's work is over and who are out seeking amusement and social intercourse with friends.

Leadville and its surroundings have been so often described that it must be pretty well known now; nevertheless, for the sake of those who may not know, or who may have forgotten, I may say that it lies on a gently sloping plateau, between two gulches, at the foot of the mountains bounding the eastern side of the Arkansas Valley, and about five hundred feet above the river-bed. Around it, to the north, east and south, and within a radius of about five miles, lie the mines which are the chief source of its wealth. To the northeast, about one mile away, is Fryer Hill, containing the celebrated Robert E. Lee mine, the Matchless, Chrysolite, Little Pittsburg, Amie, Little Chief, and several others. Eastward, on the suburbs of the city, is Carbonate Hill, with the Morning and Evening Star mines, the Catalpa, Henriett, Agassiz lease, Gonabrod, Leadville Consolidated, and others upon it. Behind it lies the most celebrated part of the camp at present, namely, Iron Mountain, possessing in its depths the Silver Cord, Iron Silver and leases, A. Y., Iron Hill Consolidated, and other mines, having an output equal to half the total output of the camp. Southeast, and farther away, lie the mines on Printer Boy Hill, famous for the rich ores obtained in the Nellie S. mine; and in the same direction, Breece Hill, Rock Hill, Little Ella Hill, Yankee Hill, and Sugar Loaf Mountain. Southward lies the once rich California Gulch, with its gold diggings, famous in the days of the Pike's Peak rush. Now it is chiefly celebrated as the location of several large smelters, among which are the Harrison Reduction-Works and the La Plata, American, and Arkansas Valley smelters. Such is a sketch of the camp in the immediate neighborhood of the city. I shall now deal with its mines and works more in detail, so as to give a fair conception of its present state.

To begin with Fryer Hill, we find that, although one of its richest mines —the Robert E. Lee—is almost laid off, pending its sale to an English company, its output for the month of June has reached 4604 tons of ore. Among its mines, the Little Pittsburg and the Chrysolite have the largest output, reaching about 900 tons apiece for the month. The Matchless, Little Chief, and Climax Contract put out from 430 to 500 tons. The Robert E. Lee just puts out enough to pay expenses pending the sale. I heard that the Matchless was likely to be bought by the English company which is about to purchase the Robert E. Lee; at least, it has the offer of it. This mine is putting out about 75 tons of ore per day just now, which I was told averaged about 80 ounces of silver to the ton. The owners of the Little Chief, after several offers from parties desirous of leasing their old dumps, decided to make what they could themselves out of them; and to this end have erected four sets of jigs (six to the set) on Big Evans Gulch, which runs just north of Leadville. There they haul all the sand and finer portions of the waste, and concentrate it, sorting out the large by hand at the dumps. It takes about fourteen tons of dump-stuff to yield one ton of salable ore, which will run from 30 to 50 ounces of silver to the ton, although the pieces of galena of which it chiefly consists, by themselves, would run as high as 300 ounces of silver per ton. This leaves a profit to the company of about 25 per cent. In this mine, they have lately run a drift northward on the east line, and have found some small streaks of very rich ore in putting up a sixty-foot rise.

I may remark here, that one of the greatest developments in this camp has, of late, been that of leasing on the part of owners to outsiders. Sometimes, it is a part or the whole of a mine, and sometimes a dump-heap. The above mine, for instance, was offered 10 per cent royalty on its dumps for what it left after washing and sorting. The foreman remarked to me, as he carefully sorted over a handful of waste, that he did not intend to bid against them. The Ætna mine is now leased to no less than four different parties. The owners in this way share the spoils without running any risk.

On Carbonate Hill, the output is somewhat greater, aggregating 5701 tons for June. The Catalpa and the Evening Star both show an output of over 1000 tons, the Morning Star coming near them with 918 tons. The Henriett, Agassiz lease, and Gonabrod yield from 500 to 625 tons. The manager told me that the Henriett mine's present rate of output was from 1000 to 1200 tons per month. The manager of the Leadville Consolidated Mining Company received me very courteously, and informed that the mine was one of the first paying mines discovered. It now holds several contiguous claims. The output is steady at from 300 to 400 tons per month, consisting, like most mines around here, of hard and sand carbonates, which run from 25 to 30 ounces of silver per ton.

I hear that the Clontarf and Brookland mines are soon to be formed into and worked under one company.

Iron Hill, as before mentioned, has the largest output, yielding 17,402 tons, while the total output for the whole camp for June reaches 34,857 tons. The largest producing single mine is the Silver Cord, where I was most courteously received by the manager, Mr. T. S. Wood, who at once proposed that I should go down the mine and see for myself. So, having donned some mining toggery, I descended, and, in charge of the foreman, was shown a part of the mine where they were busiest. No. 3 station contains one of the most magnificent breasts of solid hard carbonate I ever saw. At present, it stands 25 feet by 20 feet of solid ore. In places, it has reached a depth of 60 feet. Here and there, the sparkle of large lumps of rich galena could be seen. Altogether, it was a splendid sight, even for one who was not a shareholder. It was impossible, in the time at my disposal, to visit the other parts of the mine, which runs on an incline 800 feet deep into the hill. I was told that they had struck it quite as rich in other parts. The output runs between 3500 and 4000 tons per month, and the ore contains gold as well as silver, and a considerable quantity of lead. The Iron Silver, with its leases, which has already attracted the attention of the JOURNAL, shows the splendid result of 9700 tons output for June. In this case, to the good fortune of the shareholders and praise of the management, the original mine has had joined to it several other very wealthy contiguous mines. The A. Y. is producing about 50 tons per day, and has now got the new No. 3 shaft down to the mineral; but it is to be put down deeper yet. The Iron Hill Consolidated has an output for June of about 1200 tons, and is doing well. Other mines on this hill are also producing well.

On Breece Hill, the output was about 1250 tons last month, being pretty equally divided among the four principal mines, Breece Iron being at the head with 450 tons, the other three running from 200 to 260 tons.

On Yankee Hill, which has an output for June of 1376 tons, the Robert Emmet yields 1100 tons.

Rock Hill, with the La Plata group as its chief attraction, yields about 1850 tons; the La Plata giving about 1100 tons to this heap. Printer Boy Hill, famous for the Nellie S. mine, which some consider the richest mine in camp, shows an output of 1030 tons, of which the Nellie S. yields 750 tons. It was reported, some time ago, that ore very rich in gold had been struck in this mine; but competent authorities informed me that it was probably only a small quantity, especially as it is common on that hill to find these small pockets of gold ore.

Little Ella Hill yields about 1350 tons to the general quota, most of it coming from the Little Ellen and Opulent mines, which produced respectively 810 and 520 tons of ore last month. The Little Ellen Company is putting in a 110 horse-power hoisting-engine, and will soon have quite a large plant there. Sugar Loaf Mountain adds the insignificant amount of 310 tons from five mines in June, and winds up the list.

In looking at the ore output, one is much struck by its fairly even distribution among the leading mines; for, except in one or two instances, the report shows a wide and comparatively even quantitative output. I venture to think that this is as it ought to be if the camp is to maintain its present prosperity.

Leadville has six large smelters, besides stamp-mills and ore sampling-works. I visited nearly all, and was courteously received by the managers or superintendents. Most of them have from 5000 to 10,000 tons of ore on hand. The Harrison Reduction-Works, which were burned down in May, started two furnaces one month afterward, and are in full blast with all four furnaces now, which speaks well for the energy of the managing officials. Their stoppage largely accounts for the slight disappointment felt in the returns for the last quarter, and for which, considering this, there is really no cause. They run through from 160 to 200 tons per day. The La Plata Works, which have just passed into the hands of an English company, are not contemplating any changes at present, and are working along as usual, running off from 150 to 175 tons per day from their five furnaces. The American Works are putting through about 200 tons per day. The Arkansas Valley Works have lately been undergoing a thorough overhauling; but despite the great and

beneficial changes inaugurated during the last three months, have only been obliged to stop twice, for three hours each time. They have put in a new 150 horse-power engine, to take the place of the two smaller ones used until now. It is about the largest in the camp, and will run every thing except the pumps and electric light. Four new boilers have taken the place of the old ones. The new arrangement is very ingenious, and reflects much credit on the management; for of all tests, that is hardest which demands the economical adaptation of new machinery and plans to old works. One furnace is blown out at present for repairs; but when all are going, the works can run through from 200 to 250 tons of ore per day, which is about the largest quantity worked per day in the camp. The Cummings & Finn and Elgin smelters are on the same principle, and are running up to their full capacity just now.

The Leadville Gold and Silver Milling Company is running a large quantity of ore through per day, and shows a good output in silver bars, which are reported 969 fine. The Tabor mill was burned down on May 26th, and is consequently out of the running just now. Up to that date, it had done well. These amalgamators can treat economically a very low-grade ore, lower even than the smelters; but it must not contain lead, whereas, for the smelters, the more lead there is, the better they like it.

In conversation with the manager of four or five mines around here, I learned that it was his opinion that the camp's prospects were excellent for at least the next four years; which, as he said, was as far ahead as any wise man would care to prognosticate. He thought that the bullion output would be greater than ever this year, despite the combined disadvantages of the burning of two works, and the flooding of the mines to such a late period, owing to the quantity of snow which fell this spring, coupled with the late season.

The official statement shows that already the output has reached a total of $8,077,477 for the past half-year, with a total of $4,414,815 for the last quarter. From now until January is by far the best season for output at the camp.

With regard to the surrounding districts, the leading developments are in the Red Cliff, on the Eagle River, and the Robinson district. Both have given promise of a prosperous future. St. Elmo reports big strikes.

Leadville itself is not so prosperous as it was two years ago. In walking about the place, one observes a good many houses to rent or to sell, though chiefly in the back streets. Persons owning property here informed me that they could not obtain what it originally cost them, though these may be isolated cases. As to its prospects, it is difficult to come to any conclusion. Unless fissure-veins can be found in the igneous rocks underneath the stratified rocks, in some of which the ore is at present found, the days of Leadville's present prosperity as a camp are surely numbered. But, on the other hand, there is no saying what effect it may have on the city, if it becomes, as seems very likely, a commercial center for a number of more or less prosperous camps around. These are already rapidly forming, and, it would seem, must naturally depend upon Leadville to a large extent, not only to receive and treat their ores, but as a place from which to draw the necessaries of life. In this way, the future of Leadville may be placed on a much firmer foundation than it has at present. The question must finally drop into the hands of the railroad companies, and it may then furnish a curious example of their power to make or ruin a locality. Anyhow, Leadville's history is already made; for it falls to the lot of few places to record such an enormous output of wealth as $74,000,000 (the output to date) in so short a time. A. C.

LEADVILLE, July 12.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

DECISIONS, RULINGS, ETC.

Loss of Original Papers.—Where there is no adverse claim or protest to a mining application, and the original papers have been lost, the General Land-Office requires no republication of notice of application; but satisfactory evidence of the original publication is necessary, also as to the posting of notice, and that the same remained posted during publication notice.

Suits by Adverse Claimants.—An adverse claimant against an application for patent on a mining claim is required by law to commence a suit. The fact that a suit is pending between the same parties, wherein the adverse claimant is the defendant, does not waive the obligation. (Secretary's decision.)

Relinquishment of Surface Ground.—There is no provision in the mining laws whereby surface ground not in conflict with another claim can be relinquished, and at the same time all the rights pertaining to said surface ground which have been relinquished can be retained by the applicant. Therefore, the relinquishment of surface ground not in conflict with other claims can not be allowed, unless all the rights connected with the lode, and which are covered by said surface ground, are also relinquished. It will be necessary, therefore, for an applicant wishing to retain all the rights acquired by location to make application for all the surface ground not covered by prior locators. If only a small portion is desired, then it will be necessary to be restricted to the right to follow the lode between vertical planes drawn downward through the end-lines of claim. In this case, but not in the other, a new survey will be required. The above decision originated in the following state of facts: A mining company originally stated its claim so as to show on the surface a parallelogram fifteen hundred feet in length by one hundred and fifty feet in width, and at the same time claimed only a portion of the surface ground included within the extreme boundaries of the location. Said portion was divided into three parts: three hundred feet at easterly end, one hundred feet in width; three hundred and fifty feet at westerly end, one hundred and fifty feet in width; and a piece at discovery-shaft twenty-five feet square. The application referred to above was for surface ground twenty feet square at the discovery-shaft, and which it will be perceived is only a very small portion of the surface ground to which the applicants are entitled by location.

Discovery-Shaft in Cross-Lode.—The owner of a lode claim can not sink a discovery-shaft within the space of intersection of a cross-lode claim previously discovered and located.

Coal Land Fees.—The question was asked, Will the government charge a claimant twenty dollars per acre for coal land when the same was situated more than fifteen miles from any completed railroad at the time claimant commenced opening and improving the mine, and at date he filed declaratory statement therefor, but within fifteen miles of which a railroad was completed before said claimant made application to purchase the land covered by said declaratory filing? The Commissioner of the General Land-Office holds that, in the absence of express statutory provision authorizing a disposal of coal lands at a lower price, the language of the coal law requires that if, at the date of "application to the register" to enter coal land, the same shall be within fifteen miles of any completed railroad, payment must be made therefor at not less than twenty dollars per acre, even if a coal mine had been opened and improvements commenced thereon, or declaratory statement filed therefor, prior to the completion of a railroad within fifteen miles of the land.

Forfeiture of Co-Owner's Interest.—Section 2325 of the Revised Statutes prescribes that notice shall be given only "at the expiration of the year" in which the expenditures are made; that forfeiture accrues only upon failure to "contribute a due proportion of the expenditures by each person interested" within ninety days after service of personal notice in writing or within ninety days after the expiration of the period of publication. Will it prevent a forfeiture of "a co-owner's interest if he performs his portion of the expenditures after the necessary expenditures have been made by his co-claimant"? The above is the substance of several queries, propounded by a party in interest, to the Commissioner of the General Land-Office. He replies that, after publication of notice, the delinquent is bound to "contribute" his proper proportion, that is, to reimburse his co-claimants. But if a part of the co-owners have made all the required expenditures before the expiration of the period within which the law requires that they shall be made, the question whether the other claimants may make additional expenditures upon the claim equivalent to their proper proportion, instead of reimbursing their co-claimants, is a matter in which the commissioner is in doubt, and prefers to express no opinion upon the subject except in the event of a case of the kind coming before him, when he may be assisted by argument or guided by precedents established by the courts.

Claims upon Reservations.—Title can not legally be initiated to public lands reserved by the government from sale or other disposition, nor to lands erroneously excluded from a reservation by mistake of a surveyor. Location of claims upon reserved lands being void *ab initio*, the Commissioner of the General Land-Office has no authority to recognize locations made prior to the opening of such reserved lands to exploration and entry, as entitling locators to the preference right of purchase after the restrictions have been removed. Contests arising out of the circumstances indicated, between parties claiming by adverse locations, must be adjudicated by the courts. In the above case, mining claims were surveyed in a reservation through an error of the surveyor.

THE PRODUCTION OF QUICKSILVER IN CALIFORNIA.

Mr. J. B. Randol, of the New Almaden mines, has kindly favored us with the following interesting table:

PRODUCTION OF QUICKSILVER IN CALIFORNIA FOR TWELVE MONTHS ENDED JUNE 30TH, 1883

MONTHS.	Napa.	Great Western.	Sulphur Bank.	Redington.	Great Eastern.	New Idria.	Various.	Total (flasks).	New Almaden.	Grand total (flasks).
1882.										
July	380	410	579	195	111	169	15	1,859	2,522	4,381
August	582	490	418	184	388	130	61	2,253	2,432	4,685
September	641	513	430	225	348	129	157	2,443	2,766	5,209
October	580	516	370	251	229	266	73	2,285	2,844	5,129
November	718	200	28	96	306	156	196	1,892	2,619	4,511
December	865	339	300	311	221	126	94	2,254	2,379	4,633
1883.										
January	590	390	280	367	262	112	84	2,085	2,497	4,582
February	295	364	310	181	156	133	11	1,450	2,150	3,600
March	485	305	335	202	102	142	14	1,647	2,230	3,877
April	530	294	310	243	142	76	3	1,598	1,756	3,354
May	325	293	350	135	164	144	13	1,424	2,344	3,768
June	360	400	91	165	184	137	10	1,347	2,214	3,561
Totals	6,351	4,514	4,053	2,555	2,673	1,720	671	22,537	28,753	51,290

A NEW SMOKE-CONSUMING DEVICE.—The Illinois Central Railroad Company is endeavoring to secure a smoke-consumer attachment to its locomotives that will enable it to comply with the Chicago ordinance. For two or three weeks, the engine Robert L. Walker was running on the company's tracks along the lake front at Chicago. It was built at the Taunton (Mass.) Locomotive-Works, and has cylinders seventeen inches in diameter and of twenty-four inches stroke. It contains a smokeless furnace, invented by Mr. Robert L. Walker, of Boston, for whom the engine was built, and who brought it to Chicago in order to demonstrate to railroad men and others interested that he can effectually do away with the smoke and spark nuisance. A vertical water-table divides the fire-box or furnace into two compartments, one of which is charged with fresh coal, while the other contains freely burning coal. The compartment containing the fresh coal is closed at the top by a damper which confines the gases and is regulated by the fireman in the engine-cab. The smoke and gases arising from the fresh coal as it becomes heated, pass through a small opening over the water-tables and above the fire into the next compartment, where they are entirely consumed. The operation is then reversed by the other compartment of the fire-box being charged with fresh coal, in consequence of which the smoke and gases pass into the compartment opposite, where the fire has reached a high temperature. Any sparks escaping through the flue in front of the engine are arrested by an extended fire-box, also in front of the engine. There is in the fire-box a fire-brick arch, which becomes highly heated, and preserves a uniform temperature in the furnace and assists in consuming the gases from the fresh coal. A recent practical test in pulling heavily laden trains showed that neither smoke nor sparks were emitted from the smoke-stack.

THE MINING REGION AROUND PRESCOTT, ARIZONA.*

By John P. Blandy, Prescott, Arizona.

WITH SUPPLEMENT.

With the Report of Mining Statistics for the year 1872 there was published a geological map of the United States and Territories. This is, I believe, the only map which represents the geology of Arizona, and is, as far as my observations go, correct. It is, however, on so small a scale as to be of little practical value to the miner. I know of no other maps, even of localities, of this territory. The topographical maps are also on so small a scale as not even to serve as guides from place to place; the largest, that of Eckhoff and Ricker, being only 30 by 30 inches to represent a territory of 135,000 square miles. For these reasons, it is exceedingly difficult to describe the various mining centers in an intelligent manner, and equally so to examine such a hilly country as it is intended to describe in this paper.

When I first came into this territory, I soon realized the troubles I had to encounter in trying to form an opinion, or even to get the needed information on the geological contour. I have, therefore, labored as best I could to get a topographical diagram of the section of country represented by the map which accompanies this paper.†

The lines run by the Land Department up the valleys of the Aqua Frio, and those west of the Hassayampa, and connected east and west to the north of Prescott, enable me to correctly inclose the space covered by the Bradshaw and Sierra Prieta mountain groups; but the territory covered by these mountains, and the most difficult part, I have had to fill up as best I could. I have met with such success as to meet the approbation of those most familiar with the country, and, with the map in hand, any one would be able to cross it in any direction. As there has not been a single line of survey made across it, this has been no small undertaking, and I have had to depend upon sights from prominent points with the pocket-compass, or, in the absence of that, to make observations, with watch in hand, and guess as nearly as possible the meridian direction. But one main wagon-road passes through the district, that from Prescott to the Peck mine.

Having constructed a map with approximate correctness, it remains to mark in the general geology; but it is still difficult to draw accurately the distinct lines of junction between the formations. To do this requires an amount of muscular exertion that no one can understand unless he has tried it in such a hill-country—a region of gulches and steep, rocky hillsides, most of it covered with a growth of tangled thorny bushes, or prickly, poisonous cactus plants.

I have, therefore, only marked the general run of the rocks, without attempting the line of the boundaries of any. It is only meant as a skeleton upon which others may assist in filling in the detail as they may be able. It is the detailed geology of a region which is of the most assistance to the miner, and it can not be too minute. I am not aware that any geological map has been issued of any locality of Arizona.

I shall refer only to that part of the map which shows the country between the Peck mine and the town of Prescott. The Peck mine is situated in a primary slate formation, the north boundary of which is at Bear Run. This sweeps around in a northerly direction, crossing Turkey Creek and the mouth of Wolf Creek, the head of Cedar Creek, and after crossing the Big Bug Creek to the north of the station, passes northward by the Silver Belt mine, and is lost to view under the Aqua Frio flats and Lonesome Valley, or what is marked on the government maps as the Prescott Plains.

To the north of this formation, we have a porphyritic-granite ridge, passing from the Tuscumbia mine through to Trinity, crossing Turkey Creek at the mouth of Pine Creek, thence over the high divide between Pine and Wolf creeks. This does not show itself at Big Bug Creek, unless the small field of granite near Boggs be a continuation of the same. Next north of this granite ridge, we have a syenitic gneiss, covering the country up to the foot of Mount Union, with the exception of a narrow belt of hornblende slate, which crosses Turkey Creek at the Masterson mill. This brings us to the great granite center of Mount Union. From its sides start out the various streams of Main and East Hassayampa, Turkey, Big Bug, and Lynx creeks. Mount Union is said to be the highest peak, with the exception of San Francisco Mountain, in Yavapai County, which would make it about 10,000 feet above tide. It, with two neighboring peaks, the one to the north, the other to the south, appears more like a north and south ridge of granite, and throws out a finger forming the dividing ridge between the Big Bug and Lynx creeks, reaching nearly to the Silver Belt mine, where it abuts against the high-tilted slates of the first-mentioned formation. Another finger is thrown out to the southwestward, forming the divide between the East Hassayampa and Turkey Creek, the highest point of which lies between the Bodie and Bully Bueno mines. At the point where the Peck road crosses this divide, at the lowest point, it is hidden by a thin covering of the syenitic gneiss. Between Big Bug Creek and the head of Wolf Creek, lies a high plateau called the Mesa. This is a sheet of "malpais," or lava, from fifty to one hundred feet or more in thickness, which rests upon the vertical strata of the syenitic gneiss. The valley of Lynx Creek is occupied by a more or less stratified granitic rock, which extends southward across the head of Hassayampa, and beyond the Senator mine. This is separated from the large field of granite which surrounds Prescott by the ridge of hornblende schists which crosses the Hassayampa at the bridge, and forms a divide between it and Lynx Creek, and in which heads the North Wolf, Groom, and Granite creeks, the highest point of which is Spruce Mountain.

The Prescott granite, extending northward to the great mass of Granite Mountain, here and there incloses patches of hornblende slates, and syenitic gneiss, and is intersected by trap dikes and protrusions of columnar basalt. Of the latter, two fine examples are to be seen near the town—Thumb Butte, and a hill near the mouth of Banning Creek. To the north of Prescott, on the east side of Granite Creek, may be seen the syenitic gneiss which underlies the county eastward to lower Lynx Creek. We now have a general outline of the geology of the space lying between the Peck mine and Prescott. I have seen too little of that lying to the westward, or of that lying to the east of the Aqua Frio, to refer to it at present. It only remains to make some reference to the veins occurring in the various formations.

The large majority of these, whether in the stratified rocks or in the granite, have a northward and southward trend, varying, say, from N. 20 degrees E., and S. 20 degrees W. to N. 20 degrees W., and S. 20 degrees E. The exceptions do not vary greatly from this, although I have noticed a few that have a nearly east and west course. Among the stratified rocks, a large number are what might be called "*layer*" veins; that is, they strike and dip with the formation, and are limited in length, seldom extending for more than three or four mining claims. In many instances, I have supposed these to be formed by the warping of the strata, causing openings to be made between the strata. This is particularly the case where the white quartz ledges occur, as in the belt in which are the Bully Bueno, Yaho, and the gold ledges on Pine Creek.

The veins in the slate formation of the Peck District occur in or in contact with heavy quartz strata, locally called quartz dikes, and carry silver in form of chlorides, sulphides, and in galena. In some of the veins, large amounts of carbonate of iron occur. The quartz dikes are the conspicuous feature of the district, standing like high walls, sometimes as much as fifty feet above the slates. The finest examples of these walls can be seen near the mouth of Wolf Creek, where they occur not more than six feet thick at the base, and stand at least fifty feet high, terminating in pinnacles—a fair representation also of the dip of the strata.

The veins in the granite ridge next north seem to occur in groups, as in Tuscumbia, Trinity, and on the east slope of the Wolf Creek ridge. In these, the ores are also silver-bearing, in form of chlorides with lead, brittle silver ores, and in galena and blende. The principal vein-matter is quartz and barytes.

In the syenitic gneiss region, the veins are all silver-bearing with the exception of the belt referred to above, which passes through from the Bully Bueno mine across Pine and Wolf creeks, which are gold-bearing quartz veins. Between this belt and the granite on the south, the ores are much the same in nature as those of the granite, with the exception that there is but little antimony in combination. The vein-stones are the same. To the north of the gold belt, up to the foot of the Mount Union granite, the amount of galena in the vein increases in quantity as you go northward, until finally argentiferous galena with much pyrites is almost the only ore. The barytes also become less and less, and quartz increases in quantity. In this section, I have found the only lime spar, in form of nail-head, that I have seen in this region. This occurs in the Goodwin vein.

The veins in the Mount Union granite are all gold-bearing, many of them also carrying silver in combination with galena, and large amounts of pyrites. The gold in the croppings of the veins and to a limited depth, is free, but below altogether in the pyrites. Some veins are found containing large amounts of carbonates of lead which yield well in silver. The decomposition of these veins and of those in Lynx Creek Valley is the source which has supplied the gold to the placers in all the streams heading in this mountain, more particularly to the Hassayampa and Lynx creeks. In some of the veins of this formation, is to be found much blende of a very dark character.

The veins of the Lynx Creek Valley are, as a rule, the largest of the region, varying in width from two to twenty or thirty feet. They carry gold and silver in varying quantities. Sometimes, pockets are met with yielding at the rate of several hundred dollars per ton in gold. The occurrence of silver is much more uniform. Most of these veins have been prospected largely in the cropping and the ore worked in arrastras. This has been, however, to a limited depth, I believe never over thirty feet, and most of them much less, as the baser ores occur, and the miners have had no means of treating them.

Below the decomposed croppings, the ores are the basest of the region, being a mixture, in every conceivable variation, of sulphurets of iron, zinc, antimony, lead, and copper. Of course, all are not equally contaminated, as in some pyrites form the mass of the ore; in others, but little copper is to be seen. As a rule, it may be said that the ores will average some sixty dollars per ton in the precious metals. This district is generally regarded as the gold section of the region. The prevailing vein-stone is quartz and decomposed wall-rock. The only rare minerals I have heard of as recurring in these veins are molybdates and phosphates of lead in the Accidental mine, but I have seen none.

The veins of the hornblende schist range are gold and silver-bearing apparently in about equal quantities. The silver occurs as chloride, and also in galena, many very rich and large specimens of the former (horn-silver) having been found. In some of the veins, very rich streaks of gold have been encountered by the prospectors. Much of the vein material is of a talcose slaty nature near the walls, and the ore-streak is largely made up in many of the veins of a very flinty yellowish-brown massive quartz; this is particularly the case where galena occurs in the vein. But few veins, and hardly any of note, have been opened in the Prescott granite. On the southern edge of it, along the Hassayampa, some strong veins of gold-bearing pyrites have been opened; a strong galena vein, with a small amount of pyrites and a large vein of copper pyrites, have been developed to some extent.

To this meager description of the region I might add that a band of porphyritic slate extends on the east side of the Aqua Frio from the Homestake mine at the western foot of the Black Hills southward to Copper Mountain. Whether this formation lies next east to the slates of the Peck District or not, I can not tell, not having closely examined it. So far as examined, these porphyritic slates show veins of copper ore of high grade, containing silver in greater or less quantities from $7 to $35 per ton.

On the map, I have marked approximately the sections covered with timber. This consists of pine, oak, and juniper.

The streams called creeks, for want of a better name, might more properly be called *sluice-ways* to carry off the heavy falls of water in the rainy season. There is, however, a small amount of running water in all of them for most of the year, particularly in the winter and spring, caused by the melting of the snows.

As I have said, this is but a meager description of the geology of a large and important mineral district; but I have meant it only as a

* A paper read before the American Institute of Mining Engineers.

† The engraved map accompanying this paper is one half the scale of the original map.—ED.

beginning by furnishing an outline of the district and giving an opportunity for others to assist in building upon the foundation which is thus begun.

It will be understood that the mineral district extends much beyond that part which I have attempted to describe. It reaches southeastward to the Tip Top mine region, the copper deposits of Castle Creek, the Tiger District, and southwestward to the Vulture mine, near Wickenburg, and the gold mine of Antelope Peak; westward, to include the copper mines in Copper Basin; and on the east, it covers the copper and silver mines of the Black Hills and Ash Creek, and the gold region of Cherry Creek near the Verde. To these may be added the gold mines and placers of the Black Cañon and Squaw Creek.

This region possesses as fine a climate as can be found in the United States, fine open weather in winter, with but few storms, and those of snow. The nights, from November to April, are cold, although the days may be clear and balmy. In summer, although the thermometer may register from 105 degrees to 110 degrees in the shade, the atmosphere is by no means as oppressive as in the Atlantic States at from 85 degrees to 90 degrees. There are very few days in the year when it is too disagreeable to work in the open air. Many severe things have been said of "dry Arizona;" but it has never been called the "land of beautiful and glorious sunshine," to which it is entitled.

ON THE OCCURRENCE OF GOLD IN WILLIAMSON COUNTY, TEXAS.*

By Prof. Charles A. Schaeffer, Cornell University, Ithaca, New York.

In the early part of last year, I received a small amount of powdered mineral from Williamson County, Texas, to be examined for silver. The specimen proved to be limestone, slightly colored by hydrated oxide of iron, and assayed, per ton, $2521 in gold and $5 in silver. Supposing, of course, that this was a case of "salt," I applied for more of the material, stipulating that it be sent in lumps, and received several pieces, averaging from three to four cubic inches, which assayed $46.50 in gold. A third lot, about one peck in amount, consisting entirely of good-sized lumps, assayed $160.19. Frequently-repeated examinations of the lumps from the second and third lots convinced me finally that, in those cases, at least, the material had not been tampered with, and that the gold had been deposited there by natural agencies.

In the month of April, I visited the point from which the specimens were said to have been taken, about twenty miles north of Georgetown, and from an old shaft, about 15 feet deep, took a number of samples. At the very top of the shaft, there is a hard cap-rock, four feet thick, and below, extending through a thickness of about 2½ feet, is a bed of very porous rock, highly colored at many points with hydrated oxide of iron. Below this is a layer of very finely granular limestone, of a faint pinkish color, about six feet thick, and, still lower, another bed of porous rock from two to three feet thick. The samples previously sent me corresponded exactly in appearance with the rock in the two porous beds. Subsequent examination of fourteen samples taken by myself gave the following results: Three contained no gold, four showed a trace, and seven contained amounts varying from $2 to $20.67 per ton, the average of the fourteen being $5.46. These results, though low, nevertheless showed the existence of some gold, and it was therefore deemed advisable to investigate the subject more thoroughly. In the month of June, I revisited the place, and spent several weeks in prospecting the neighborhood.

Extending through Williamson County from north to south, covering a breadth of from four to nine miles, are a number of long, low hills, generally from fifty to a hundred feet above the surrounding prairies. Near the top of one of these ridges, was the shaft previously referred to. The rock was all horizontally stratified, and there was no evidence or probability of any vein. If gold was present in paying quantities, it would undoubtedly be found in the beds of porous rock. To test the permanency of the existence of gold, seven shafts were sunk at various points around the original shaft, and at distances varying from one hundred to three hundred feet. In all of these, the porous strata were encountered, and, so far as the external appearance of the rock was concerned, it was found to be precisely the same as in the first shaft, although the thickness of the beds varied somewhat at different points. Fifty-two specimens taken from the various points where the porous strata had been exposed, and from the outcroppings of the same, gave the following results: Twenty contained no gold, and thirty-two contained amounts varying from $1 up to $231.50, the whole fifty-two averaging $15.20.

Further investigation convinced me that, although these results were apparently highly favorable, nevertheless the average of the whole rock is far below the figures indicated. Selecting from all the points worked thirty-two lots, they were all carefully sampled and the samples assayed. Of these samples, thirty-one contained no gold, and one contained $1 per ton. The examination of the dirt taken from the dry beds of the ravines, below the level of the two beds in question, showed sometimes one or two very minute colors, but more generally nothing at all. While, therefore, not desiring to call attention to this locality as a possible source of supply of gold, I nevertheless wish to record the fact that gold does occur at the point in question in moderate amounts.

The most remarkable feature of the occurrence is the fact that the limestone is undoubtedly Cretaceous. It is generally stated that gold may occur in rocks of all ages, and Professor Kerr, in a recent paper read before the Institute,† concludes with these words: "From the facts here given, it would seem that gold is so widely diffused that we may expect to find it in any kind of rock." Nevertheless, I believe the occurrence of gold in Cretaceous limestone has not as yet been reported in the United States.

As regards the mode of deposition, it is very evident that it got into the rock in the condition of auriferous iron pyrites. The calcium sulphate, resulting from the decomposition of the pyrites and the limestone, has all been washed out, occasioning the porous character of the rock, and the greater part of the brown oxide of iron and the insoluble gold remain entangled in the pores and crevices. At some points, the gold has been concentrated by the action of water, while in others it is entirely absent. Unfortunately, there is no way to distinguish between the auriferous material and that which is entirely barren, since the amount of the oxide of iron seems to bear no relation to that of the gold present.

There is a tradition, very commonly believed in the neighborhood, that, two or three hundred years ago, the Mexicans obtained silver there, and, in proof of this, attention is called to a large number of irregular trenches to be found at many points on the hills. These trenches have, with the lapse of time, become partially filled, but in all cases they are easily identified by the large blocks of the hard cap-rock which are strewn around on both sides and in the trench itself. So far as silver is concerned, the popular idea is clearly a mistaken one; but it would seem not improbable that, in the days of cheap peon labor, this district may have been worked for the small amount of gold to be found.

* A paper read at the Boston Meeting of the American Institute of Mining Engineers.
† Transactions, Vol. X., p. 476.

AMERICAN MINES IN THE ENGLISH MARKET.

Mr. William Weston has written one of his vigorous letters to the London *Mining Journal*, which so forcibly deals with questions frequently discussed in this country that we make room for the following abstracts from it:

For those who wish to buy developed mines which are now actually paying, there are plenty of them in San Juan. I have often heard it said in London, "If the Americans have any good mines, they keep them; but if they have any worthless ones, they come over here to unload." That they "keep them" is not true, as no man will sell quicker at a fair price than an American. There are thousands of good mines and prospects in Colorado for sale, and an Englishman's money is just as good to the owners as that of their own countrymen, so the first part of the wise saw is bosh. That a great many worthless American mines have been brought to London I admit; but if they found purchasers there, who have the buyers to blame but themselves? No man is so generally skeptical of every thing American as the astute Britisher; and no man, when he does buy any thing American, does so with such utter folly, as a rule, as that same gentleman. He exercises far less care than he would if buying a horse, and in most cases buys it through the medium of three or four different lots of middle-men, and naturally pays four times as much as if he bought it from the owner, as those modest and obliging mediums generally expect to realize out of the transaction quite as much as the owner receives for his property. Then, when the buyer finds he has been sold, he declines to admit his own folly, and raises a hue and cry against Americans and their mines in general. Just about as mean and cowardly as the man who goes into a gambling-den with the intention of winning the gambler's money; but when, instead, the gambler wins his, he calls on the police to help him get it back again.

Now, I will explain why it is that so few really rich American mines find their way into the English market, and I can best do this by telling how some of the best dividend-paying mines have been placed on the American market. I will mention names of neither men nor mines, to avoid the suspicion of surreptitious "puffing." There is in America a firm of two gentlemen, said to be worth fifty millions of dollars, which they have made legitimately in their business, which is what I call being "jobbers in mines." They have a staff of trusted experts; and when they hear of an exceptionally rich mine or prospect, they send one of these men to examine, with power to write a check for it on the spot if necessary.

Having bought it, they then proceed to develop it thoroughly, by creating large reserves of ores, erecting pumping, hoisting, and reducing machinery, thus bringing the mine into a permanently paying condition. Then, and not till then, do they organize a company, and offer the shares to the public, and the public takes the mine readily, paying this firm, of course, a very handsome profit, which, as they have had all the risk, they are thoroughly entitled to. As long as the public gets good value for its money, and a mine that pays good dividends, they neither ask nor care how much profit the vendors make out of it. And it must be remembered that this firm, although they rarely do make a mistake, are not infallible; sometimes a mine turns out badly, and then, as they do not offer it to the public, they lose all they have paid for it, or put into development.

On the other hand, how do the English get hold of American mining properties? Chiefly from the hands of middle-men, who are generally penniless adventurers, who get hold of a bond or option on some mine for such length of time as will enable them to get up a company, advertise the shares, and so get the money to pay for the property and their own commission; the bringing of the mine into a paying condition being quite an after-consideration, and one which these gentlemen care nothing about. And I assert, as a positive fact, that the owners of really good mines in Colorado will not tie their property up or have it hawked about London by adventurers. I do not mean to say that all properties that come to the public through middle-men are worthless by any means, as some of them are very good, and as the purchasers are put into communication with the owners and the property reported on by reliable English engineers, every thing is square and above-board. To show why some rich mines never find their way to London, I will cite a case in point. I know a mining property in the San Juan region, near Ouray; fair claims on the same vein all in pay, the ore yielding from 50 ounces to 500 ounces of silver and 10 ounces of gold per ton of 2000 pounds; price, £150,000 cash, with fully that amount of ore (gross) in sight; title perfect; true fissure-veins; and total length of claims along the course of the vein 6000 feet. The owners of this group are the original discoverers, and will not tie their property up to any one for six months, in order to give them a chance to sell it. Why should they? The dead-work alone has more than paid all expenses; and if they want some money, they can take it out of their mine. There is the property for sale at a price, and the owners are content to bide their time, knowing that, sooner or later, a buyer will come along and pay them cash for it. Therefore, they have no inclination to tie it up for six months, in order to let some middle-man or promoter of companies take it to England and try to sell it. And as no middle-man will take the trouble to try and sell it in England without a firm option, the property does not find its way there. On the other hand, owners of worthless properties

which they can not sell themselves will readily give an adventurer a bond or option on the property, and take the chances of his being able to sell it.

Owners of rich properties like the one I have named will give a bond or firm option if they are paid for—that is, if a certain sum be paid down, that sum to be applied on the purchase money if the sale is consummated, or forfeited if it is not; but those as a rule who play the role of middle-men have no money to pay for any thing.

From the foregoing, it will perhaps be understood why so many poor properties go to England. To reiterate. No owner of a really rich paying property or promising prospect in Colorado will tie his mine up to a party of middle-men for six months, in order to give them the chance of getting the money to pay for it, unless he gets a sum paid down as forfeit-money, or unless he happens to be very well off, and have a great deal of mining property to dispose of, and I know of such exceptions now offered in London, and very good properties they are. If a few wealthy Englishmen would do as the firm of American jobbers before mentioned—come to San Juan and see the mines themselves, or send their engineer to examine, with power to write a check if the property proves as represented, they would get some of the richest gold and silver mines in the world, and at reasonable figures. It will be asked, perhaps, "If these men own such good gold mines, why do they wish to sell them?" But no miner or man who knows any thing about mines will ask such a question. Most of our richest mines and prospects in San Juan are still held by the original discoverers—poor men. Every miner knows that it takes large expenditures of capital to put a silver or gold mine into permanent pay. By this I mean creating reserves of ore at least two years ahead, erecting pumping and hoisting machinery and reduction-works to treat the ore. If they take ore out of their mine without doing this, I call it "picking the eyes out" of their mine, and no good miner will do it. In San Juan, we have a number of phenomenally rich silver mines, which have paid from the grass-roots; but because they will do this, it is no reason why they should have their eyes picked out; on the contrary, they are the very ones that deserve the greatest care and the most systematic development.

In one claim of the group of four already cited, there is ore in sight to the value of half a million dollars—ore actually blocked out, and I have heard it said: "Instead of selling their mine for £60,000, why do not the owners go to work and take it out of the mine?" Simply because they are not fools. The ore already blocked out is above water-line, and this taken out, they would have to erect pumping and hoisting machinery to go deeper. More than this, as they have no capital to erect reduction-works, they would have to sell the ore to local buyers at a large sacrifice of profit; then, again, it would take some years to mine it without any capital. So, as the owners have other mining property to develop, and as the country is rich and new, and plenty more mines to be found, they prefer to stick to their legitimate business of prospectors—that is, finding and selling mines. They prefer, in fact, rather to take a reasonable sum, cash down, for their mine, and sell to men who can afford to develop it into permanent pay, than to "pick its eyes out," wait two or three years for their money, and then, perhaps, have a white elephant on their hands in the shape of a rich mine, without the capital to enable them to get the ore out any deeper.

THE PRODUCTION AND UTILIZATION OF GASEOUS FUEL IN THE IRON MANUFACTURE.*

By W. S. Sutherland.

(*Concluded from page* 22.)

In the first part of my paper, it is pointed out that, to insure sound welding, the gas should be supplied with the requisite air in constant and definite proportions. To secure this, it has been found necessary to mix the gas and air thoroughly together before combustion, care being taken to prevent explosions, and dissipate them if they should happen. A very powerful and concentrated flame is thus secured, which, when it contains an excess of gas, has no tendency to oxidize the iron, and gives a very soft, mellow heat. I do not believe that mixed gas and air have ever been worked in this way before—at any rate, not on the large scale that we work on—and, as must generally be the case in new combinations or methods, the study of its action must be instructive. Explosions of the mixed gas and air are prevented by very simple means, and the method has now been at work for some ten years without accident. I should like, in this connection, to mention that, when an explosion occurs in any ordinary working mixture, it does not instantaneously travel along the mains, but is carried forward in the form of a wave or disk of flame, traveling with a certain velocity. This disk seems to have some dynamic properties which liken it to a solid mass in motion. Thus, it will not turn a corner readily unless obliged to do so, and strikes any thing it comes against with great force. If, then, at a convenient corner of the mains, an outlet be provided in the direction of the delivering main, and a light cover of India rubber be fastened on, the disk of fire will cut it out or break it, just as a blow would do, and no further damage is done. Indeed, I have often watched this disk of fire moving backward and forward in a passage, and obeying the hand that was closing and opening the gas and air-valve. The ordinary Bunsen burner, in which the gas and air mix as they come together for combustion, is always supposed to produce a higher temperature; and since by the above system a far more perfect mixture and diffusion can be obtained, it naturally occurred to me that this offered an easy solution of the problem of obtaining high temperatures. And so it does, but coupled, I must confess, with some drawbacks. I have spent much time and trouble over it, and argued in this way: If it be possible to keep down the carbonic acid in producer gas, while at the same time storing up in it nearly the whole of the thirty per cent of heat before mentioned, and if by mixing the gas with the proper amount of air before burning a rapid combustion be effected, why could not this simple means be employed to burn fuel generally? And if it be true that mixing the gas and air raises the temperature, this increase could only be at the expense of the outgoing gases; therefore a kind of regenerative action should be set up that would cause an accumulation of heat at the root of the flame, and which would extend itself as the action went on.

Now, I must say, and can show in practice, that all this is true; but so far, its application seems to be limited to special uses, of which steam-raising is one of the chief. Consider that by this means the full effect of the fuel can be produced directly it enters the boiler, so that complete combustion is secured at once, and the gases have only to give up their heat in passing along the boiler; that the highest temperature is produced at the very first; and that there is therefore a greater fall and consequent better duty, and you will then say that there is reason in what I say. But in these general uses where Dr. Siemens has introduced his magnificent system of regenerators, experience has so far shown that his system is better, and for the following reasons: Suppose a stream of mixed gas and air to enter a furnace. There is no trouble about diffusion, since the gas and air are already thoroughly mixed, and therefore they ought at once to burn and give out their highest temperature; and since the rate at which the gases will conduct depends upon the temperature of the heating body (the initial heat of the gases being supposed constant), and as well upon the thickness of the stream of gas, it follows that if this higher temperature be produced quickly, and the stream of gas be kept thin as it enters the furnace, more heat should flow back into the hinder layers of the gas while those in front burn, and that thus the reaction would tend to accumulate heat at the root of the flame in precisely the same way as in a coal fire, so that the faster the gases are driven into the furnace the greater the temperature would become. Now, all this really happens; but in a coal fire the fuel is traveling back, carrying heat with it, which is not the case in the gas fire, and this has to be allowed for. Besides this, the rule of conduction in the gases must be within certain limits of proportion to the speed with which the frame travels back, so that to get the highest temperatures with good producer gas, the flame must be made to envelop to some extent the stream of incoming gases, in order to make it as hot as possible all around, and this stream must also be made very thin. All this is exceedingly difficult to manage. Sometimes all goes well, a great wave of heat can be seen accumulated round the tuyere, and the furnace is hot directly; but the next minute, without any change in the quality of the gas mixture, the wave of heat is blown away from the tuyere, and in a moment or two the furnace goes down. Still, this system can be used in many ways where regeneration is not applicable, as in steam-raising and in chemical works, and wherever a very high temperature is not desirable, although, for economical reasons, it is better in most cases to get the highest temperature attainable. It is not easy to understand how the rise of temperature tends to extend over the remoter parts of the furnace; but heat always tends to flow from the hotter to the colder parts, as is well known, and the heat in a furnace may be compared to a mound or wave of water on a stream driven over an eminence which remains stationary while the water goes on. The higher temperature gradually spreads more or less in the furnace, without at all breaking the law of conservation of energy, the increase of heat being always obtained at the cost of the waste gases.

Ten years' experience with thoroughly mixed gases has tended to confirm the timid views advanced some years ago. These observations refer to the action of the different gases and mixtures of gases and air upon iron and steel in welding and heating, and in puddling iron as well, in which direction some experience has been gained with them.

In a paper read before the Royal Society, Professor Graham showed that iron at an elevated temperature is permeable by both hydrogen and carbonic oxide, and especially so by the latter gas, and he added that in the process of manufacture soft iron absorbed or occluded within it a considerable volume of carbonic oxide, "which it carried about ever after." Now, in treating iron or steel, the only general fuels we have are carbon and hydrogen and compounds of them, which are all burnt with oxygen. The iron is practically always oxidized when in the ore; but after treatment in the blast-furnace, it contains more or less carbon; and leaving out silicon, sulphur, phosphorus, and other impurities, the metal varies almost indefinitely between pig-iron and ore, becoming white iron, cinder iron, cast-iron, steel, soft steel, wrought-iron, pure iron, and burnt iron containing oxygen. Therefore, if there be no impurities in the iron beyond hydrogen, oxygen, and carbon, all these different qualities would be owing to some difference in the relative quantities of these substances in the iron, to the manner in which they are combined or mixed, and to the different states in which they and the iron may be. In treating iron for welding by the aid of mixed gases and air, it is found that the first essential is, that there be an excess of gas in the mixture. The slightest excess of air, of fully combined carbonic acid, or steam infallibly burns the iron, makes it rotten and the weld becomes a bad one. If pure hydrogen in excess be used, it is difficult to weld with it. A higher temperature is required, the iron appears to remain hard up to the melting-point, holes are easily eaten into it, and when broken the iron will be found to have a fine white crystalline fracture. The weld is strong, but very short, as in steel. If carbon be the fuel used, the weld varies from a coarse, steely fracture, to a ductile one, and sometimes a rotten one, according as the carbon or air is in excess. If carbonic oxide in excess be used, the iron begins to soften at a lower temperature, becomes pasty, and seems to effervesce; when welded, it is very tough, and breaks with a tough, dark, silky fracture characteristic of wrought-iron. If soft steel be welded, it will not bear the same degree of heat that wrought-iron will, but tends to fall to pieces on the hearth; when welded with a good carbonic oxide flame, however, it works very well, and stands a good elongation before breaking.

From observation of these facts, I always endeavor to get as much carbonic oxide as possible in my gas, and as little hydrogen and oxygen as I can, consistently with obtaining the requisite temperature. Pure iron can only be regarded as a chemical curiosity, which may for a moment be produced in practice, but which passes at once to wrought-iron or oxidized iron. Now, in making steel in the Bessemer converter, the metal is heated with air until all the carbon is blown out; and if the process could be stopped at exactly the right place just when the carbon had all become carbonic oxide and remained in the metal, undoubtedly a soft, ductile metal just like wrought-iron might be produced without having to add any spiegel. But so long as any unoxidized carbon remains in the iron, I say from experience it would work "raw," as the welder says, when welded, and would be crystalline; and if iron oxide remained

* A paper read before the British Iron and Steel Institute.

in it, it would be rotten. Now, why should we not recognize Professor Graham's definition, and say that while steel is iron containing unoxidized carbon, wrought-iron is iron in which carbonic oxide is occluded, taking the intermediate place between carbon in steel and oxygen in burnt iron? Carbon and carbonic oxide are both soluble in iron, while carbonic acid and oxygen are both practically insoluble, but a low oxide of iron is again soluble. It seems reasonable to imagine that carbonic oxide, which must be fluid in the metal, acts the part of a solvent in allowing a proper coming together of the particles, while carbonic acid and oxygen tend to keep them apart, and iron oxide, while somewhat soluble, acts the part of carbon in pig-iron in an exaggerated degree, in that it causes the metal to become softer, and even rotten, when cold. A curve might be drawn showing the transition from one state to another, in which the admission of carbonic oxide would lengthen out the point representing pure iron. Now, the conclusion I wish to draw from all this—if you decide that it is just—is an important one.

To produce a good, true wrought-iron which will weld well, and in all particulars take the place of the best puddled iron, use the Bessemer converter or an equivalent vessel, and instead of blowing raw air into it, blow Siemens gas (which contains an excess of carbonic oxide) along with the air, in varying proportions, until at the finish a proper excess of gas is present. To keep the metal fluid with this proper excess, let gas or air, or both, be heated to a sufficiently high temperature before going in, and pass them, in thin streams side by side, under the surface of the metal—that is, through the bottom, sides, or wherever they can be got to go—so that when they come in contact with the metal the mixture may be perfect, and good wrought-iron will be produced. Now, it may be objected that the present action in the converter produces carbonic oxide. True, and I believe that, if it were possible to blow out all the carbon and stop just at the right moment, wrought-iron would be produced; but in reality, the metal would be overblown at one part, while another would contain some carbon, a third carbonic oxide, and so on. If, however, carbonic oxide in excess were blown in with the air, the sum of the actions would, as it were, steady the process all through, and lengthen out the carbonic oxide or wrought-iron period, so that the whole could be brought to the proper quality without fear of being overblown. Again, it may be said that analysis shows that carbonic oxide does exist in overblown Bessemer steel, but always with nitrogen, hydrogen, and oxide of iron, because Mr. Lowthian Bell and Dr. Aldin Wright have shown that carbonic oxide will not take out the last portion of oxygen from the iron oxide (produced by the over-blow), which thus keeps the metal rotten; and besides, the carbonic oxide is not sufficient to do what is expected from it. It is always not any one action which takes place, but the sum or resultant of a great many; and to get the carbonic oxide to do its work properly, it must as much as possible be in excess. The object of this process would be simply to produce wrought-iron, with all its good qualities increased; and although I perhaps ought not to say so here, certain dynamic considerations make it probable that this process would greatly facilitate the elimination of sulphur and phosphorus, while it is but reasonable to expect that its introduction would cheapen wrought-iron as well as improve its quality.

NOTE RELATING TO "WATER-HAMMER" IN STEAM-PIPES.*

By Robert H. Thurston, Stevens Institute, Hoboken, N. J.

The writer has been called upon during the past winter, in the course of his professional work, to examine into the systems of steam heating in use on so large a scale in New York City and elsewhere, and to report upon the condition and capabilities of one of those "plants" which have been put in operation. In the course of this investigation, he was compelled to examine into the peculiar methods of injury to which long lines of steam-pipe thus used are exposed.

The action familiarly known as "water-hammer" had been long known to him, as to every engineer who has had much to do with steam-power, and its singular effects had been often observed and commented upon by him, as by others; but in this case, these effects were developed on so large a scale, and were so serious oftentimes in their consequences, as to impress upon him the desirability of examining into the matter more carefully than had yet been done. He has not been able to make a systematic and thorough investigation such as he would have liked to make; but he has been able to collect some facts, a few of which will be here presented, that may at least have the effect of calling the attention of engineers more generally to this matter, and may lead to further study of the subject.

When a pipe is filled with steam, and then has introduced into it a quantity of cold water, or when a pipe, itself cold, and containing cold water, even in very small quantity, and without pressure, has steam turned into it, the first contact of the two fluids is accompanied by a sudden condensation which causes a sharp blow to be struck, usually at the point of entrance; and sometimes a succession of such blows occurs, which are the heavier as the pipe is larger, and which may be startling, and even very dangerous.

It is not known, so far as the writer is aware, precisely how this action takes place in all cases, or what conditions are most favorable to the development of the tremendous pressures which are often produced. Perhaps the action is as follows:

The steam, at entrance, passes over or comes in contact with the surface of the cold water standing in the pipe. Condensation occurs, at first very slowly, but presently more quickly, and then so rapidly that the surface of contact between the two fluids is broken, and condensation is completed with a suddenness that produces a vacuum. The water surrounding this vacuum is next projected violently from all sides into this vacuous space, and, crossing it, strikes upon the surface surrounding it. As water is nearly incompressible, the blow thus struck is like that of a solid body, and the intensity of the resulting pressure is the greater as the distance through which the portion of surface attacked can yield is less. In this manner, enormous pressures are sometimes produced.

In some cases, it seems certain that such pressures may be caused at points in the pipe far from either end and from the point of entrance of the steam. For example, a pipe may lie in a nearly or quite horizontal line, and, if not fully drained, may contain a considerable quantity of water lying in the lower portion, while the steam may flow in above it. The passage of this steam along the surface of the water may cause some disturbance of the surface of the liquid, and this disturbance being gradually increased as the flow of steam becomes more rapid, may finally cause a break in the surface of the water, which disturbance may produce more rapid condensation and still further agitate the mass, until condensation occurs with such rapidity that a vacuum is formed at the point of greatest action. The next result is the rushing of steam from both directions toward this point, carrying with it, as it goes, masses of water which, coming from opposite directions with enormous velocity, meet at the intermediate spot at which the condensation has been most rapid, and being stopped by instant collision, produce a pressure which may only have as its limit the strength of the pipe.

Where the pipes are not burst by this action, it is common to see them sprung and twisted out of line, torn from their connections, and, when a succession of shocks occurs, as is often the case, the whole line writhes and jumps lengthwise to an extent that is sufficiently serious to cause well-grounded alarm.

The writer had an opportunity, in the course of his work on the case above alluded to, to obtain some probably approximate measures of the intensity of this action in long and heavy lines of pipe. Four lengths of eight-inch pipe had been split by this action, and the writer desired to ascertain whether they remained, in their injured condition, strong enough to bear the ordinary steam pressure of the line from which they were taken. This never rose above fifty or sixty pounds per square inch. They were therefore subjected, in a proving-machine, to gradually increased pressure until the already fractured parts were still further injured, the repairs, or rather, the patching, having been carefully done in such a way that they were not strengthened by it. This was done by putting on soft patches along the line of the split and securing them by bolts which were set in the line of the split. The patches thus served as simple stop-valves, preventing the exit of the water through the break.

The following are the results of the tests:

Pipe No. 1.—This pipe was split, near one end, for a distance of fifteen inches, along the line of the weld. When placed in the proving-machine, it bore the applied pressure until it attained an intensity of 400 pounds per square inch, when the split suddenly extended about ten inches; the pressure could no longer be kept up, and the test terminated.

The pipe was then taken to a pipe-cutting machine and the injured part cut off. It was then again subjected to pressure. It bore a pressure of 1100 pounds per square inch—the highest that it was convenient or customary to apply to that size—and was taken out sound.

Pipe No. 2.—This length was cracked for a distance of fifteen inches along the line of weld, not far from the middle of its length. The crack had opened a little and the pipe was slightly bulged. This piece bore 300 pounds, and then gave way, the fracture extending just enough to let off the pressure.

At the opposite end of the pipe, was another split, eight inches in length. The part just fractured was cut off, and the remaining portion was again subjected to the water-pressure. This time, it bore 1050 pounds per square inch when the crack was started, and ran about fifteen inches. It began leaking, and showed plainly the effect of the pressure at about 800 pounds.

This was an unusually interesting specimen, as the pipe had been bulged considerably by the water-hammer along the line of the eight-inch crack. The pressure afterward borne, therefore, seemed to the writer to be likely to be a fair measure of that product originally by the water-hammer. Such bulging as was here seen never occurs at usual pressures. The new break did not follow the weld, but ran irregularly, and apparently indifferently, through weld or solid iron.

Pipe No. 3.—This length was split for a distance of 22 inches, the end of the break being about three feet from the end of the pipe. It sustained a pressure of 250 pounds. The sound part of the pipe was then tested up to 1050 pounds without injury.

Pipe No. 4.—This piece was split, like the last, and to just about the same extent, was tested similarly, and gave way at 300 pounds per square inch.

All of this pipe was eight-inch pipe, three eighths of an inch thick, and made with the usual form of lap-welded joint. The welds were not always perfect, as is probably the fact with all such pipe; but this pipe, butt-welded, would have borne very much higher pressures than those to which it was subjected, in ordinary work, by the steam carried on the line. It can not be asserted that these lengths of pipe did not split under pressures less than those to which they were afterward subjected by the writer, as it is very possible that the first blow may have found a weak part of the pipe, and the split may, in some cases, have extended to stronger portions. Nevertheless, the writer is inclined to believe that this was not the case in all instances, and is convinced that, in one case at least—that of the eight-inch crack which was accompanied by a decided bulge in the pipe—the water pressures, at the test, were at least approximately equal to, and are very likely to have exceeded, those obtained at the later test. It seems to him very certain that we may consider it as proved that the pressures produced by "water-hammer" are often enormously in excess of those familiar to us in the use of steam, and that they have, in many cases, exceeded 1000 pounds per square inch. It is, then, evident that it is not often safe to calculate upon meeting these tremendous stresses by weight and thickness of metal, but that the engineer must rely principally, if not solely, upon complete and certain drainage of the pipe at all times as the only means of safely handling steam in long pipes, such, especially, as are now coming into use in the heating of cities by steam led through the streets in underground mains.

The facts here presented have been, to the writer, something of a revelation, and have seemed to him to possess unusual interest and importance to the engineer using steam under such conditions as are here referred to. It is a fact which has long been well known, that these suddenly produced pressures are often very great. The writer has occasionally, for many years, known of serious and sometimes fatal accidents due

* A paper read at the Cleveland Meeting of the American Society of Mechanical Engineers.

to this cause; but that these stresses are often as great as is here indicated, has probably been as little realized by engineers generally as by himself.

DISCUSSION.

CHARLES E. EMERY: The paper of Professor Thurston is valuable, but, I am sorry to say, incomplete. In the first place, the wording of the introduction is unwittingly well calculated to perpetuate a fraud. Last fall, the New York papers were filled with accounts of explosions of steam-pipes, and, in spite of all protests, refused, except in their advertising columns, to call attention to the fact that there were two steam companies, and that the difficulties were on the lines of but one of them. Few read the advertisements, and the press outside of New York copied only the news items, so to this day there is a general impression all over the country that steam enterprise in New York has been a failure. While, ordinarily, engineering facts are valuable, without reference to time, place, or persons, the above statement, with some explanations further on, show the necessity in this case of stating at the outset that the New York Steam Company, of which a gentleman from your beautiful city of Cleveland is president, has not required the services of Professor Thurston, and has been supplying steam continuously since April of last year; while another company, namely, the American Heating and Power Company, the plant of which Professor Thurston reported upon, and ambiguously describes as "one of those plants which have been put in operation." actually ceased operations early last winter, after a few months' abortive trial, and is now in the hands of a receiver, who is endeavoring to sell the property in the interest of the bondholders. The phenomenon of the "water-hammer" is familiar to most steam engineers, particularly those who have had to do with the large pipes used on ocean steamers. The writer, from his connection with the New York Steam Company, had full opportunity to watch the operations of the American Company, and is surprised to find in the paper of Professor Thurston no reference to one of the chief causes of danger in operating the pipes of that company.

Warring nations and political parties have each a war-cry, and an opposition stock company has to have a "tin image on wheels," or a something that can be talked up as being better than the regular thing. Water-gas made a good opposition to coal-gas, and even now is useful in helping the petroleum combinations to work off their naphtha. The people who built the new road through Cleveland, parallel to the Lake Shore, talked "Nickel-Plate"—that is, they did the work well and succeeded in selling out at a profit, as was intended. The American Heating and Power Company did not do this way. They engaged General Newton, who knew how to spend government money, and therefore ought to know about steam, which other people study for a lifetime, and induced him to trail his uniform in the dust of trade. He was their "tin image on wheels," and he invented their war-cry, namely, "superheated steam" (his patent being among the company's effects), and this cry raised the money among brokers, merchants, and clerks who thought they understood all about steam—"superheated steam," at least. The engineer, Mr. R. H. Buel, has done some engineering work of a literary character that is a credit to himself and the country, and should have known better than to attempt to carry superheated steam in underground pipes. One of the consulting engineers, a very able man, should also have known better. Professor Thurston should have known better when he was called in; but the attempt was actually made. The regular superheaters were never used; but a series of pipes in the boiler setting answered the purpose to a limited degree, superheating the steam, it was said, some 60 or 70 degrees, probably more at times, as the demand for steam varied; for who could regulate such an apparatus, or, in fact, any apparatus for such a purpose? The results are evident. Of course, the branches of the line where little or no steam was used soon cooled down, so as to contain only saturated steam, and at times all the branches were in this condition. Upon opening a valve anywhere, however, a circulation would be established, which in due time, but not at once, would bring the superheated steam into that line, and all the conditions of an explosion be present as soon as the steam reached any collection of water, it being evident that water, which is harmless in the presence of saturated steam of the same temperature, would act as an efficient condenser of steam at a higher temperature, though of the same pressure as that due to the temperature of the water. The reduction of volume thus caused would not be as great, of course, as if steam were forced in contact with cold water, but entirely sufficient to cause a flow of steam from both directions, bringing with it more water to reduce the volume of more steam, thereby causing collision; with a necessarily great increase of local pressure, straining the pipes, causing the joints to leak at all sorts of odd places where there were apparently no reasons for the difficulties. The more violent explosions were undoubtedly due to a combination of the straining effects due to the reduction of volume of superheated steam, with the more potent one of direct contact of steam with water cooled below the temperature, due to the pressure during times of inaction, the forces being brought into action more strongly when the steam was conducted through one pipe to heat an adjoining one. The conditions which brought about the bursting of the pipes undoubtedly varied with the circumstances of each particular case and with the peculiarities of each location. As the advance-sheets of Professor Thurston's paper only reached the writer when already busily engaged, a day ahead of the time when this must be sent on to be read in connection therewith, it is not possible at this time to fully discuss the subject, and its consideration in a more serious vein must be left for a proposed paper on the general subject of "District Steam Systems," which it is expected will be prepared when all the problems necessary to a complete mechanical and financial success shall have been analyzed and the necessary apparatus put in practical operation.

PROFESSOR TROWBRIDGE: I am amazed that Professor Thurston should give this paper the distinctive character of personal and individual research on his part. As a matter of fact, the investigations to which he alludes were conducted by a commission, not by himself personally or individually. The American Heating and Power Company of New York requested General Newton and myself to investigate the causes of the bursting of so many of their pipes and the breaking of so many valves in their plant, and I was asked individually to recommend a third member of the commission. I recommended Professor Thurston, and he was appointed. The commission entered upon a long examination, which involved the inspection of the plant, the testing of the pipes which had been burst or split, and the examination of witnesses who were supposed to be expert in steam-fitting. More than two weeks were consumed in these investigations, the results mentioned in Professor Thurston's paper being included in the final report of the commission. That final report was drawn up by myself and, with minor changes, was signed by General Newton, as chairman, Professor Thurston, and myself. The whole subject of water-hammer was discussed for days, and Mr. Frederick Tudor, of New York, at my suggestion, came before the commission, and showed by a simple experiment the effect of condensation to which Professor Thurston refers in his paper. The pipe tests were made by Morris, Tasker & Co. for the commission, and the whole commission was to have been present at the test; but unexpected circumstances prevented General Newton and myself from attending. The results were, however, furnished as a part of the investigation carried out by the commission. In regard to the *theory* given by Professor Thurston of the cause of "water-hammer," whether it be correct or not, it is simply a repetition of suggestions made during those investigations. Mr. Osborne, of St. Paul, and Mr. Frederick Tudor, had each in his extensive practice experienced in a variety of ways the ill-effects of water-hammer, and both confirmed the conclusions to which the commission in its discussions had already arrived. I can not, therefore, let this paper of Professor Thurston's pass without correcting the impressions conveyed by the writer that the results and the report referred to were his own individual productions. Where a commission of experts investigates a subject and makes an official report, as in this instance, it seems to me remarkable that one of the members should allude to its joint investigations and report as his own, without reference in any manner to his associates.

THE TELEPHONE IN A COLLIERY.

A Bell telephone has been fitted up in the Marie pit of the Cockerill Company's colliery at Seraing, Belgium, and has worked without a hitch since the second of April last; so satisfied, indeed, is the company with the experiment, that it is about to put down a telephone in all its shafts. The apparatus on the surface is placed near the winding-shaft, at a point easily accessible to both the day and the night hands. The underground instrument is placed in the main rolley-way, and the wire is protected by gutta-percha, being attached to insulators about every fifty yards. This wire is kept as far as possible from that of the electric signal, so as to avoid any induced currents, which would give rise to difficulty, and even danger; for when the telephone was first put down in the Marie pit, and the call-bell of the telephone was rung, the electric signal was heard at the same time, which misled the banksman. The telephone is found to render great service in the colliery, the ease of communication saving a great deal of time. In the event of an accident to the ropes, the cages leaving the guides, the derangement of the cage signal (whether electric or otherwise), or a stoppage from any cause whatever, instantaneous communication may be made from the bottom to the surface, or *vice versa*.

THE LUMINOSITY OF HEATED GASES.—Dr. Werner Siemens has recently demonstrated, by means of his regenerative furnace, that highly heated gases do not emit light. The furnace employed was that of his brother, the glass manufacturer of Dresden, which gives a temperature of from 1500 degrees to 2000 degrees Centigrade. The interior of the furnace was watched through side-holes, and not the least light met the eye from the highly heated air of the furnace. It therefore appears that all light from heated gas must come, not from the gas, but some solid radiating impurity. Observations with a thermo-pile also seem to show that no heat either is radiated by pure gases at a high temperature.

RUSSIAN BASIC STEEL.—Mr. Sergius Kern, of St. Petersburg, writes as follows to the *Chemical News:* It was a very interesting object for the writer to test the qualities of the basic steel of Russian manufacture. Near St. Petersburg, the Alexandrovsky Steel-Works are commercially working the basic process in Siemens-Martin furnaces.

The plate steel welds quite like iron; in fact, the Nevsky Works, St. Petersburg, rolling the ingots, make, out of the remaining scrap, piles which, heated to a welding heat, are rolled into capital plates for different purposes. The following are the results of trials of the steel plates:

Unannealed Plate.

Thickness in inches.	Breaking weight. Tons per square inch.	Elongation in 8 inches. Per cent.
½	26	29

Annealed Plate.

½	22	36·25

The chemical composition of the steel runs as follows:

	Per cent.		Per cent.
Carbon	0·10	Sulphur	0·02
Manganese	0·43	Silicon	traces
Phosphorus	0·02	Copper	none

I am informed that the raw materials charged into the furnace contain, on the average, 0·75 per cent of phosphorus. I am very happy to state that the great invention of Messrs. Thomas and Gilchrist is worked in Russia in such a satisfactory way.

MESSRS. CRADDOCK & CO., of Wakefield, are now manufacturing a special rope in which the wires and strands are both twisted in the same direction, thus giving a much longer surface of the wire exposed to friction, which lessens, if not entirely removes, the cause of wires breaking on the crown of the strands; and as the working of the rope around drums and pulleys bends the wires in an oblique direction, the greatest amount of wear possible from the wires is secured, as they will not break until too much reduced, and become therefore too weak for their work. The wires in the strands on this principle have a longer bearing one against another than in the ordinary system, and

prevent much injury which results from the wires in each adjoining strand cutting into one another. There are claimed for this rope greater durability and immunity from wires breaking when but slightly worn, which has caused many ropes to be put aside as useless. One of this make, 4¼ inches circumference, and 350 yards long, was used at Blackwell, from July 31st, 1880, to September 23d, 1882. When taken off, there were only six or eight broken wires in the entire length; but as the wear on each outside wire was so nearly the same, thus making possible the collapse of a good number at once, it was thought advisable to put on a new one.

FURNACE, MILL, AND FACTORY.

The fillers at A. M. Byers & Co.'s Girard furnace have struck against a reduction of fifteen cents a day.

A test was made recently, in Philadelphia, of a cold-packed pipe-joint, as operated by the Consolidated Pipe-Joint Company; and though a pressure of 240 pounds to the square inch was applied to the pipes, not a drop of water escaped from the joint. The test was made at the machine-shop of John Baizley & Son, No. 513 Penn street, in the presence of a number of visitors. Among those present were Gas Trustees Smith, Kelly, Gill, and Rittenhouse; President Smith, of Select Council; Superintendent de Kinder, of the Water Department; and ex-Governor Hoyt. The packing is of lead, which is cast in a belt about the pipe close to the joint, and too large to fit the opening which it is intended to calk. After the lead is cooled, hydraulic pressure is applied to the belt, and it is forced into the pipe-socket, making a perfectly tight joint. By the present method, molten lead is run into the joint. On cooling, the lead shrinks, and it is necessary to use oakum calking to make the joints tight. The economy claimed for the new method is, that it saves 60 per cent in lead, makes a joint that will not leak, saves time in operating, and can be used in a smaller trench than is required for the present system of calking.

The Northwestern Steel Wheel Company has recently been incorporated, and is at once to erect works at Chicago, Ill. Its purpose is to manufacture a newly patented steel wheel for agricultural machinery. Its works will consist of a machine shop and foundry.

The *Industrial World* says that the Fowler Rolling-Mill Company, Chicago, has recently doubled its capacity for the manufacture of the Fowler spike by the placing of an additional train of rolls, a 100 horse-power engine and boiler, and additional furnaces. By some improvements lately made by Mr. Fowler, he is enabled to carry an old rail from the furnace and convert it into finished spikes in fourteen seconds. By this process, the usual reheating of the iron is obviated. The company has just purchased the remainder of the block adjoining its works, which will give it the necessary enlargement of the plant.

The Fort Pitt Steam Boiler and Plate Iron-Works, of Pittsburg, Pa., formerly operated by D. W. C. Carroll & Co., are now wholly in the hands of Mr. D. W. C. Carroll, who was the senior member of the old company.

Park Brothers & Co., of the Black Diamond Steel-Works, Pittsburg, have closed a contract with John Roach & Sons to furnish a large amount of steel to be used in building the government vessels.

Greenwood rolling-mill, Tamaqua, Pa., which was closed some time ago by the failure of C. F. Shoener and the Greenwood Rolling-Mill Company, has been leased by Messrs. Daniel Snepp and H. A. Weldy, who will start the mill some time this month. They will engage principally in the manufacture of hoop and merchant iron.

The largest weekly production of iron made by a furnace in Sharpsville was that produced by Spearman No. 2 last week, the output being 728 tons, or 104 tons per day.

By act of legislature, the name of the Orford Nickel and Copper Company has been changed to the Orford Copper and Sulphur Company, proprietors of the Bergenport Copper-Works. This change has been made as indicating more clearly the business carried on by the company, it having discontinued the mining and smelting of nickel ores. The company purchases, and refines and sells on commission, copper ores, cements, mattes, and bullion. Mr. Robert M. Thompson, Nos. 37 and 39 Wall street, being general manager; W. E. C. Eustis, of Boston, president; and C. F. Atkinson, of 19 Exchange place, Boston, treasurer.

The Murphy Iron-Works, of Detroit, have just set up two of Murphy's smokeless furnaces for J. S. Kirk & Co., Chicago, and are now busily constructing six more, for which orders have been received.

The Chicago Gas Fuel and Light Company is laying three principal mains in Chicago and erecting its works preparatory to prosecuting its business with vigor. The works, covering an area of 265 by 374 feet, are located at the corner of Hanover and Butler streets. The company will use the Lowe water-gas process. It will start with a daily capacity of 3,000,000 feet, and possesses sufficient room to enable it to double that capacity, if required. The machinery is now getting into place, and the company will be ready for business November 1st. Four purifying-boxes, 25 by 30 feet, with 30-inch seals, and two holders with capacity of 1,250,000 feet, will be used. By November 1st, 100 miles of pipe will be laid, including a 24-inch main surrounding the south side of the city. In these preparations, 800 men are employed, and 900 consumers have contracted to take gas from the company.

The American Forsyth Powder Company, of California, has purchased five hundred acres of land near Shippenport, Morris County, N. J., for a consideration of about $11,000. The land is in one entire tract, unbroken by a county road. The works, when completed, will cost nearly $1,000,000. The property is the tract at Shippenport which was owned by the Dover Bank, but does not include the forge. The bargain for the property was consummated about two weeks ago, and the papers sent West for the signature of Mr. James B. Lewis, one of the officers of the late bank, who is now making a visit to Dakota.

Four hundred men are thrown out of work by a fire which destroyed the shops of the New Haven Rolling-Mill Company, on the 15th. The loss to the company in buildings and machinery is about $50,000. The fire broke out over the annealing-boxes. It could have easily been put out when discovered, but no water was to be obtained. The city water company had cut off the water supply to the mill, in order to make repairs to the mains.

A terrible boiler explosion occurred at the anthracite iron furnace of the Philadelphia & Reading Railroad, at Kutztown, on the morning of the 17th. At four o'clock, the inhabitants of the place were aroused from their slumbers by a rumbling sound like that of an earthquake. This was followed a second later by a shock that was strong enough to knock people from their feet. It was found that one of eight boilers walled in had exploded. The furnace is operated by Messrs. William M. Kaufman & Co., and the casting hour was half-past four A.M. Just before the final preparations were made, the men went outside to get some fresh air. Suddenly a terrible noise of escaping steam was heard, and the next instant the boilers were lifted with a crash and the furnace was a wreck. Large portions of the boilers were thrown long distances, and the air was filled with flying *débris*, among which were the mangled and lifeless remains of the workman. One large piece of boiler iron was sent flying through the air, and landed nearly a quarter of a mile from the boiler-house. The stock-house of the furnace, the boiler-house, and adjoining buildings were torn to splinters. Four men were fatally injured, and many others sustained serious injuries. The only man killed was Franklin Waltman, twenty-one years of age. He was fearfully lacerated, and his body, limbs and head were a charred mass. The damage to the property will amount to many thousands of dollars. The seven boilers that were thrown out of position by the explosion were badly damaged. The furnace will have to be entirely rebuilt.

The steel-mill and two of the furnaces of the Bethlehem Iron Company were put in operation on the 19th, and the force of men will be increased daily unti the full number is at work. About 100 men have been sworn in to do speciall police duty and to protect the workmen should an attack be made upon them by the Union men.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

CONTENTION.—The work of enlarging the main shaft to admit pump-works is pushed vigorously. The uprise from the bottom of the shaft has reached a distance of 255 feet. From the surface, the compartment is down 30 feet. The pumps have arrived, and the work of building the stone foundation will be commenced in a few days. Prospect-work in the mine has been discontinued during the enlargement of the shaft. Enough ore is, however, daily extracted to keep the mill running.

GRAND CENTRAL.—No important developments are reported. Work is progressing as usual.

TOMBSTONE MILL AND MINING COMPANY.—A new concentrating mill is building at Charleston, with a capacity of 100 tons per day, to be used in concentrating tailings. Fifty tons per day are forwarded to mill and smelter, supplied mainly by West Side, although Tough Nut and Good Enough are yielding considerable amounts.

GILA COUNTY.

OLD DOMINION.—According to the Globe *Chronicle*, this company has bought all the property and plant of the Long Island Company, consisting of the Cuperite, Gray, Hoosier, and Nevada mines, and the thirty-ton smelter. It is probable that the furnace will be moved to the site occupied by the other Old Dominion furnaces, and that all four stacks will shortly be running steadily. It is stated that the company also proposes to smelt copper ores for mine-owners in the district, and that probably an additional furnace will be erected for that purpose.

YAVAPAI COUNTY.

RICH HILL GOLD MINING COMPANY.—The prospectus states that the property of the company consists of a gold-bearing ledge 1500 feet long by 600 feet wide, situate in Weaver Mining District, Yavapai County. The ledge or claim is named the Van Arman claim, and was located in 1882. Some work was done on the ledge—sufficient to demonstrate its richness. The ledge is seven feet wide, a true fissure-vein. Assays from croppings show all along the ledge that the quartz is rich in gold. The nature of the country is rough, although there is plenty of wood near the mine. Water is, however, scarce, and in milling will have to be carried one mile in pipes, unless a well is sunk or water is found in the mine.

CANADA.

PROVINCE OF ONTARIO.

ROBERTSVILLE.—The iron mine, on account of depression in the iron trade, has been obliged to close down. The Roberts Company mined about 100 tons per day and employed about twenty men, whose wages averaged $4000 per month. The Levant mine is still in active operation.

COLORADO.

ARAPAHOE COUNTY.

Smith, Hibbard & Co. are just completing a new crusher and smelter in Denver, which is expected to do work cheaper and better than any now in use. Though some parts of the machinery are still unfinished, enough has been completed to enable the management to run fifteen or sixteen tons of very refractory ore per day of twelve hours. Just at present, experiments are making with some heavy zinc ore with a view to save the zinc. Should these be successful, a new industry would at once be instituted in Colorado; for while there is an abundance of ore carrying 50 per cent of zinc, no process has heretofore been able to separate it. This ore is known as sulphate of zinc.

BOULDER COUNTY.

MATTIE.—This mine has been bought by the same company which purchased the Keystone some time ago. Machinery will be placed on the workings at once, the same now used on the Keystone. The latter property will be supplied with a new plant of machinery, which has been purchased and will arrive immediately. It is rumored that a smelter will be erected in connection with the concentrator.

CLEAR CREEK COUNTY.

HOOSAC.—At the Little Mattie mine, the property of this company, the shaft has attained a depth of 280 feet. The 150-foot level is in over 200 feet west of the shaft, and the lower or 250-foot level has been run 150 feet west. Three shifts are driving the latter ahead, on a good ore-streak, while for a year past stoping has been carried on in the upper level. The ore mills high in silver and gold, averaging about $200 per ton. The monthly shipments are from twenty to thirty tons. The new engine-room, shaft-house, and ore-house have just been finished. The new machinery, consisting of a thirty horse-power hoisting-engine, and two thirty horse-power boilers, is in place and works satisfactorily.

PERKINS TUNNEL LODE.—This mine, at which a recent rich gold strike was made, is rapidly developing. Several new shafts have been sunk in tracing the vein. Several tons of ore will be sent to the mill in a few days.

SUMMIT TUNNEL AND MINING COMPANY.—The tunnel has been driven steadily ahead into Belleview Mountain, until now they have reached a depth of tunnel near 600 feet. At the expiration of their present contract, steam-drills, air-compressors, and all the necessary machinery for driving the tunnel 3000 feet will be put in place. This company owns nine patented lodes in this mountain, all of which will be cut by its tunnel, which is driven 5½ by 7½ feet in size. Up to this time, nothing but solid granite has been met with. The company expects to strike its first lode at about 1000 feet, and will eventually reach the Specie Payment lode, which will be struck at great depth. The enormous outlay necessary for the completion of this tunnel, and before any returns for the capital invested, shows the confidence the incorporators have in this district, and their enterprise.

DOLORES COUNTY.

SOUTH PARK.—Since the change in the ownership of this mine, it has been worked steadily. The tunnel is in 300 feet from its mouth, and a cross-cut has been run 35 feet to the south, where the flat or blanket vein was struck. A rise has been made 15 feet high, and in ore all the way. A drift has been driven 40 feet farther south, in the vein. This drift is 4½ feet wide and 6½ feet high, all in ore. The ore of this mine is in black manganese, carrying sulphurets and large quantities of native silver. The ore mill-runs from 175 to 450 ounces of

silver per ton, and from 10 to 15 per cent of lead. The mine is shipping from 10 to 12 tons per day.

GILPIN COUNTY.

It is stated that a party of capitalists will erect a stamp-mill in or near the mouth of Moon Gulch, which will be run on custom ore from several of the developed mines in Boulder District. There is plenty of wood and water near at hand. It is expected that the mill will be up and running in ninety days.

CALIFORNIA.—No work is done below the 1500-foot station in the main shaft, now 1450 feet deep. Since breaking the steel wire cable, sinking has ceased, the water now being nearly up to the 1400-foot station. A new cable is expected, when the water will be taken out and the sinking resumed.

HIDDEN TREASURE.—The main shaft has attained the depth of 1400 feet, making it the deepest mine in the State of Colorado. Present development-work is doing in the 1500-foot west level. The 1400 level, when driven to the California mine on the east, will strike that shaft at the depth of 1500 feet, there being a difference in the elevation of the ground of 100 feet.

GUNNISON COUNTY.

The Gunnison Iron and Steel-Works have, after a thorough examination of the properties on Gold Hill, purchased the claims known as the Deadlock, Bullion King, York, Sinbad, Michigan, and Iron Mountain. These claims all lie to the south of the wonderful Cumberland, whose production of iron is well known. The vein that crops boldly to the surface on the Cumberland is easily traced to the apex of Gold Hill, across the above-mentioned claims, which, only partially developed, show that the iron exists in large bodies. Work has already been commenced, and the force will be increased to 200 men very shortly.

HINSDALE COUNTY.

MASTODON.—The run of this ore at the Crookes concentrator has been a success. Out of the nine tons run through, there are three tons of concentrates, two and a half of which will give 70 per cent lead. The other half is second-grade, with more or less lead. The ore was not assorted, but taken from the width of the vein.

LAKE COUNTY.

Late Leadville exchanges contain the following: "It has long been realized," says the *Herald-Democrat*, "that the facilities for treating the ores produced in this district were entirely inadequate, and, as a result of this, a new smelter is about to be provided under a co-operative system. Several meetings have been held in reference to the scheme, and the conferences have been most satisfactory. At least one million dollars will back the enterprise, and it is expected that work will begin very shortly."

ADAMS.—This company has been organized to work the Brookland and Clontarf mines. The pumps at both shafts are running at full capacity, and the Clontarf shaft, already free from water, will begin taking out ore immediately. As soon as the transfer of the properties is completed, an effort will be made to connect the two shafts by a level, when the Brookland will be used principally for pumping, while the extraction of ore will be carried on through the Clontarf.

EVENING STAR.—The recent new strike shows a gray sand and hard gray lead carbonate, assaying respectively five ounces in silver and fifty-eight per cent in lead, and eleven ounces in silver and thirty-three per cent in lead. The new discovery is considered of importance, as up to the present time the mine has failed to disclose any ore in this portion of the claim, although several winzes were sunk to the ore-plane as the incline advanced.

GLASS-PENDERY.—The property has opened a large body of iron ore, through which are disseminated good-sized pockets of fine ore. Shipments of iron ore, running from six to eighteen ounces, are made regularly, while at short intervals lots of very fair ore are sent to the smelters. The mass of iron developed in the mine is very large, and being situated below the old working-levels in the mine, it was considered advisable to drive a drift to connect the ore-body with the Glass shaft. Only about twenty feet yet remain to be cut through, when the connection will be effected, and the ore can then be extracted at greatly reduced expense.

LITTLE PITTSBURG *vs.* LITTLE CHIEF.—Col. J. B. Bissell, referee in the case of the Little Pittsburg *vs.* the Little Chief Mining Company, July 13th, returned a verdict awarding the Little Pittsburg Consolidated Mining Company $19,400 and ten per cent interest per annum for nearly three years. The history of the case is about as follows: During October of 1880, while Mr. John T. Herrick was manager of the Little Chief mine, he learned of a fair streak of ore situated on the line of the Little Pittsburg claim, which his predecessor, Mr. George Daly, had left standing and lagged up. Mr. Herrick directed his foreman to take down the lagging and extract the ore. On these orders, the miners of the Little Chief entered the premises of the Pittsburg and began the extraction of ore, following the ore-body for about thirty feet. Hearing work in progress, the Little Pittsburg immediately drove a drift to intercept the trespassers, but failed to reach them until, it is alleged, about thirty thousand dollars' worth of ore was broken down and shipped by the Little Chief Company. Evidence for a suit for damages was immediately collected, and a suit instituted. Numerous delays followed, and finally Col. J. B. Bissell was appointed to receive testimony, and listen to the arguments of the attorneys. In justification of his act, the manager of the Little Chief alleged that, while connected with the Little Pittsburg mine, that company obtained twice as much ore from within the boundaries of the Little Chief claim, and now connecting with the Little Chief, and seeing an opportunity to equalize matters, he embraced it, and stoped the ore from the Little Pittsburg territory as alleged. The Little Chief filed a claim as an offset to that of the Little Pittsburg, and of nearly double the amount, and also attempted to show that the claim of the Little Pittsburg was excessive.

MATCHLESS.—A ten-ton lot of ore, averaging 375 ounces to the ton, was shipped recently. The northern workings of the mine now show about six feet of lead carbonate ore, the greatest quantity of this character ever disclosed in the Matchless. The southern portion of the claim is disclosing additional pockets of rich horn-silver.

NEW PITTSBURG.—Considerable work is in progress on the property of this company.

ROBERT E. LEE.—A great deal of exploration-work is doing at present.

ST. LOUIS.—This mine on Breece Hill, is making some very fair ore-shipments. The property embraces the principal portions of the former Colorado Prince and Miner Boy mines, together with the main shafts, tunnels, and buildings on these properties. During the past few weeks, the lessees have shipped about fifty tons of low-grade oxidized ore, the value of which has not yet been ascertained. The mine also produced, and in various small lots, some quite high-grade gold ore.

PARK COUNTY.

LONDON.—A special dispatch says that this company's stamp-mill has been demonstrated a success. The clean-up amounts to from 155 to 150 ounces of amalgam in twenty-four hours, worth from $800 to $1000. It is believed the mill will produce $1000 a day from London ores steadily and without increasing the capacity. Embrey concentrators are to be put in the mill to work over the concentrates.

PITKIN COUNTY.

ST. ELMO CONSOLIDATION.—The mines embraced in this property are located in Conundrum Gulch, a short distance from Aspen, and during the present season have been worked with considerable activity. A shaft seventy-five feet in depth has been sunk at the St. Elmo mine and has been drifted from in all directions. The shaft has penetrated a good body of quartz carrying silver glance, and assays have been had as high as five thousand ounces. In the development of the claim, about one hundred tons of ore have accumulated upon the dump, and it is the intention of the owners to begin the shipment of this matter to the Aspen smelter at once.

SUMMIT COUNTY.

CINCINNATI.—This mine has been leased. The lessee has done a considerable amount of development-work, cleaning out old tunnels and shafts. This property was once thought to be the most valuable in Summit County, but for several years has been suffered to lie idle. General Wilson, the lessee, has a contract to operate the mine for several months, and expects to ship three car-loads of galena per week.

KEYSTONE BULLION COMPANY.—The works are running to their full capacity and are concentrating nearly 100 tons daily, which will give about two car-loads of concentrates per day. The principal source of supply is from Mayo Gulch, the Washington group, the Penn-Breckenridge property, and the Union mine, also the IXL property at Swan.

DAKOTA.

CALEDONIA.—The superintendent reports for the week ended July 1st: Ore produced, 1050 tons. We have not started the drifts in the winze, but have begun stoping ore there. Every thing in and about the mine is running in good shape. July 8th, reports: Ore produced, 1025 tons. Shipped 595½ ounces gold, value $10,000. The ore on 400-foot level at bottom of winze is looking well as work advances. The mill is running to its full capacity.

FATHER DE SMET.—The superintendent's report for the week ended July 8th, shows ore extracted from first, second, and third levels, 1950 tons. Ore milled, 1950 tons. Golden Gate north header advanced 7 feet. Header in 165 feet.

IDAHO.

High water in Snake River has somewhat interfered with mining. The sluice-boxes have generally been temporarily removed, but are replaced as the water subsides. Two new companies are just beginning work. One company is making a ditch on the west side of the river. It is stated that the St. Paul Placer Mining Company is going to do work on a large scale.

PHILADELPHIA MINING AND SMELTING COMPANY.—Good progress is made at the company's works. The mines are opening up well, and showing large quantities of ore that can be extracted at slight cost as compared with most of the mines in this section. The two old smelting-furnaces of the company are doing good work and running right along, turning out from one and a half to two car-loads of base bullion per day. The two new furnaces just erected are ready to start. When the four furnaces get to work, they will reduce about 120 tons of ore, and yield from 40 to 50 tons of bullion per day. The works, started as an experiment, are now an assured success. They have, during the past two months, received ores from over fifty mines. The quantity of ore so far received exceeds 2500 tons, of which nearly a thousand tons remain in the bins at the works. This ore came from mines scattered all over the Wood River or smelting section, and averaged 55 per cent in lead and about 100 ounces in silver.

MEXICO.

A correspondent of the Mexican *Financier* writes about the mines at Tlalpajahua as follows: Tlalpajahua is in the northeast corner of the rich State of Michoacan, close to the boundary of the State of Mexico, and within about four miles of Mineral del Oro in the latter State. At Mineral del Oro, an American company is putting in a twelve-inch pipe pump, and fine hoisting machinery, and is building reduction-works. Not less than 3000 miners can be had here at 50 cents a day, and common peons at 31 cents. There is plenty of low-priced fuel; oak-wood at $4 a cord, and pine at $3. The streams here have plenty of water in the rainy season, and from February to June they become low; but at any time, there are not less than 100 miner's inches of water, and it would be very easy to use it as a motive power and for hydraulic purposes. What we greatly need here are reduction-works with two or three stamp-mills of from 50 to 100 tons capacity each. There are here fourteen quartz-veins varying from six inches to 15 feet in width, and there are over one million tons of rejected ores on the old dumps giving from $10 to $25 a ton. Our city is paved with quartz, and there is no doubt that some day some smart American company will undertake to mill all this quartz and to pave over the streets of Tlalpajahua with the regular country-rock. The arrastra men are hauling ore from the old Corona's and Borda's dumps as far as sixteen miles, working the ores on the ancient and primitive arrastra, saving some of the gold, the rest being lost, together with all the silver.

Tlalpajahua is about nine miles south of the Mexican National Railroad, and is convenient to two stations, El Oro and Tepetongo, to which we have very good wagon-roads. There are ten or fifteen mill-sites here, with more or less water-power. Some new locations have been made here lately, among them one by several employés of the Mexican National Railroad. They have almost one kilometer in length on the Temascales vein, one of the good veins of the camp. They are working steadily, and before long will cut the main vein. Not less than fifty smaller mines are idle for want of reduction-works, as all we have here now is a five-stamp mill, made by Fraser & Chalmers, of Chicago, which is worked by water-power with fine results. This mill is working the ore of the Concepcion group of mines, the owners of which are both Mexicans and Americans. They have ore as rich as $500 to the ton, but never less than $50. The ores of the different veins of the camp are almost all of the same kind—quartz with sulphurets and native silver; some chlorides may very rarely be seen, but all the ores have high grades of gold.

Several of the mines are capable of producing from fifty to several hundred tons of ore daily; among them may be counted the Coloradillas, Santa Rosa, Azteca, San Juan, Concepcion, Borda, La Nacional, Jesus María, and fifty more. Several other mines can produce very rich gold ore, and their output is from five to twenty five tons each, daily. Among them are the Sirena, Comanja, El Muerto, La Trinidad, Santa Rita, La Casa, and many more smaller veins. In fact, what we need here is modern-process milling-works, capable of reducing from 50 to 100 tons a day; and before a year or two are passed, this camp can produce ten times that amount, as here are hundreds of mines now just on the surface with none of them more than two or three hundred feet deep, with the exception of the Borda, which is about 400 feet deep. These Borda mines produced over $35,000,000 just before the war of independence, but they are now full of water. The Borda group is owned by a Chicago company, which has been fixing the roads from the town to the mines, and extensive machinery is expected to be working there before long.

The mining interests at Zomelchuacan, Vera Cruz, continue to be most encouraging. A new gold mine has recently been denounced in the district.

Some very good lead mines have lately been opened near Jalacingo. The ore assays 70 per cent lead and eight ounces of silver to the ton of 2000 pounds.

CONSOLIDATED MINING COMPANY.—This company of Zomelchuacan has sent its first bar of gold to the mint. More will be sent as soon as it can get the new amalgamating pan which has been ordered. The company has been building quite extensively for the new smelter, which will probably be soon in operation

There is a considerable quantity of lead carbonate ores on hand to start it up with.

MIQUITA.—A rich vein of ore carrying gold has been recently struck.

SAN JUAN DE DIOS.—This mine, situated in the Hermosillo District, Sonora, has been sold to an American company for $87,000.

MICHIGAN.

The Marquette *Mining Journal* gives the following table, which exhibits in gross tons the total lake shipments of iron ore from upper peninsula ports the present season, up to and including July 11th, together with the amount shipped from the same ports during the corresponding period of last year :

Name of port.	1882.	1883.
Escanaba	726,403	480,869
Marquette	406,980	183,?21
L'Anse	17,338	18,377
St. Ignace	10,427	2,518
Total.	1,161,148	685,585

Showing a decrease of 475,563 gross tons.

CHAPIN.—At the west end of the mine, the ore-body shows a width of from 100 to 130 feet of ore ; and as the Ludington has 103 feet of ore on the same vein at the most easterly point to which mining work has reached, it is quite apparent that the Chapin has a body of ore yet untouched within the limits described. An attempt to reach this ore by a shaft put down in the overlying quicksand has been made, but was not successful, and the management will adopt some other plan of attacking it.

FRANKLIN.—In the interest of economy, the management is preparing to use coal on the mine for steam purposes. A tramway from the lake front to connect with the foot of the incline is just completed, which will be used in transporting coal to the top of the hill with but one handling.

OSCEOLA.—Preparations are making to erect another head of Ball's stamps in the dressing-works.

ROPES GOLD MINE.—The boiler for this mine is now in place, and, as soon as the steam-pipes are in, the pumps will be started up and the shaft unwatered, when mining will begin in earnest. Sinking and drifting will be prosecuted, and the lode shown up as fully as can be. The mill is ready to begin stamping as soon as the power to drive it is in shape.

MISSOURI.

THE NEW ST. JOSEPH CONCENTRATING MILL.—The St. Louis *Republican* has a letter from a correspondent in which he gives the following details on the new St. Joseph concentrating mill, at Bonne Terre, built to replace the works destroyed by fire on February 25th :

The rebuilding of these works was begun on the ninth day of March last, and on the 25th of June instant, one of the largest and most complete mills in existence, occupying the sites where the old mill stood, and filled with improved machinery for dressing ores, was completed and set in operation.

The main building is 150 feet long by 122 feet wide. The engine and boiler-houses at the north end of the mill are respectively eighty feet long by thirty wide and ninety by forty. The boiler-house at the south end (partially completed) is sixty feet long by forty wide, and the machine-shop is fifty feet long by twenty-five wide. Except the lower story of the main building, all these structures are built entirely of iron on stone foundations. The lower story is built of oak timber, but covered with corrugated iron. It has three hundred and fourteen upright columns, sixteen inches square, which carry the crushers, rolls, screens, pipes, and pumps, all below the main floor, and support the long lines of shafting. There are in this mill six Blake crushers, seven pairs of Cornish rolls, sixteen double percussion-tables, thirty-six double horizontal jigs, thirty-six plunger jigs, two Wilbraham pumps, with a capacity of 3500 gallons per minute ; five Knowles pumps ; fifteen centrifugal pumps ; thirty-three mortised, beveled, and spur-gear wheels ; 120 pulleys, and over 3000 feet of belting. This machinery is operated by two Harris-Corliss condensing engines, having a combined capacity of 300 horse-power, built in Providence, R. I. Five batteries of boilers supply the engines with steam. Three months and a half from the day on which the first stone was laid in the foundations of these buildings they were virtually finished, and the entire machinery, made in many different places throughout the country, was in place. The engines were started and tested on the first day of June, instant, and now hundreds of wheels are making their rapid revolutions and answering the purposes for which they were devised.

MONTANA.

GALLATIN COUNTY.

HENRY VILLARD HYDRAULIC GOLD MINING COMPANY.—A description of this company's property shows the following : The mines are situated in Emigrant Gulch, about twenty-five miles from Livingstone, on the road to the National Park. The company owns what is believed to be the old channel of the gulch. It has about 380 acres of ground. A small portion of this has been worked continuously for the past twenty years, and has yielded a large quantity of gold. One claim now worked by hand yields a net profit of $11 per day to each man. Since purchasing the ground, the company has sunk five prospect-shafts twenty-five feet deep, and they show good pay-dirt all the way down. This, however, does not take them down to bed-rock, there being from sixty to one hundred feet of gravel on the bed-rock as shown by the old workings. The company owns the Mill Creek water-right ; and for the purpose of more extensive operations than at present, it proposes to construct a ditch eight miles in length, to bring its waters to the mines. It will have a capacity of six thousand inches, which will be fully sufficient for all requirements. Thirty new claims adjoining this ground have been taken up recently, for the working of which water will be procured of the company.

MADISON COUNTY.

BELL.—This mine, situated in the vicinity of Virginia City, is developed by two tunnels, one of which is over 400 feet. The average width of the vein is 15 feet, and the rock assays 40 ounces of silver, with considerable gold.

PROSPECT.—This property has a shaft 35 feet deep, from the bottom of which is a level 220 feet, the ore along the ledge assaying 50 ounces in silver. Still below is a tunnel in 200 feet, the ore assaying about the same as in the upper level ; and still below this is another tunnel, in 400 feet, which assays 40 ounces. The width of the vein where it has been struck in all the tunnels and levels is from ten to twelve feet. One hundred and sixty feet from the mouth of the lower level, starts an incline, which is down 35 feet.

VIRGINIA CONCENTRATING COMPANY.—A concentrator of 130 tons capacity is building at Virginia City for the purpose of testing the ores in the immediate neighborhood. It it should prove a success, more extensive works will be built.

SILVER BOW COUNTY.

ALICE.—A three-foot ledge of 277-ounce ore has been uncovered on the west drift from the 200, which is undoubtedly the same vein which has been stripped on the 100-foot for a distance east and west of over 300 feet. Cross-cutting to intercept this body of ore will be commenced immediately from the 400-foot level.

BELL.—The concentrator has started up, and it is expected will work from 60 to 70 tons of ore from the low-grade dump per day.

NEVADA.

ALBION.—Since so many varying reports concerning this property have been published recently, the Eureka *Sentinel* has felt obliged to give the correct facts. They are stated as follows : At the time the last assessment was levied, Selby & Co., smelting and lead company, the principal creditors of the Albion Company, agreed to advance sufficient funds to pay off the miners and laborers, who held liens against the mine to the amount of $45,000, which they did advance in cash. They were also willing to postpone the payment of their own claim, amounting to $120,000, as well as that of Prescott, Scott & Co., foundrymen, amounting to $20,000 more, in order to give the mine a chance to work itself out of its financial embarrassment by allowing it to run and to be developed. It was then considered by the trustees of the Albion that, if an assessment of 50 cents per share, amounting to $75,000, could be collected, it would put the mine in such a financial condition as to relieve it of its pressing necessities, and enable it to carry on the work of development. It was with this view that the 50-cent assessment was levied. The stockholders, however, refused to pay the assessment, which brought into the treasury of the company 112,000 shares of the delinquent stock. But neither the trustees of the Albion nor the creditors are responsible for that. It is true that the mine has been advertised for sale for a claim of $1800 by a party holding an execution ; but this claim was settled on the 1st of July, and the execution withdrawn. There is no expectation here that the mine will be sold at all ; but we have it from the best authority that it will not only not be sold, but that it is the intention of the present management to push the development of the mine with the utmost vigor, and that it is not an exaggeration to assert that the Albion mine will probably be entirely out of debt within the course of the present year. It may be safely predicted also, that within a few months the condition of the mine itself will be better than ever before. A later report by the same paper states that 25 tons of ore were hauled from the Albion to the Eureka Consolidated furnaces, July 9th, the first shipment since the recent adjustment of affairs and the general transfer of accounts to Prentiss Selby.

EUREKA CONSOLIDATED.—An official letter shows that at the Locan shaft the main drift is running as rapidly as possible. One furnace is running and producing as usual. The following prospect-work has been done during the week : 3d level uprise on quartzite, 12 feet ; in all, 64 feet. Main drift, Locan shaft, driven this week 42 feet ; in all, 47 feet.

UTAH.—The following gentlemen were elected to serve for the ensuing year at the annual meeting : Charles H. Fish, President ; R. H. Follis, Vice-President ; G. C. Pratt, Secretary. The Board of Trustees is as follows : Charles H. Fish, Richard H. Follis, and D. B. Lyman. The superintendent's report shows that a great deal of repair work has been necessary to keep the openings in a safe condition. At the 1350 level, the south lateral drift has been cleaned out and retimbered 775 feet to the company's south line. At this point, the drift connects with an incline winze leading up to and connecting with the Sierra Nevada 1200-level drift, which runs in a southerly course to that company's shaft. Through these openings, we get natural ventilating air. The drifts also contain the pipes which convey the water from the mine to the Sutro Tunnel. At a point 315 feet north of the incline, No. 1 crosscut has been extended 87 feet ; total length, 207 feet. This drift has been advanced farther to the west than any other without finding the west wall. At the 2500 level, the east main drift has been extended 69 feet, the face of which is in very hard rock and free from water. No work has been done in the south lateral drift during the year. The flow of water remains unchanged. An unlooked for expense has been incurred in repairing drifts and water-pipes through which the water flows to Sutro Tunnel. Early in March last, the pipe burst at a point 1100 feet south of the Sierra Nevada shaft on the 1500 level. Owing to foul air and the caved condition of the drift, it was impossible to reach the break until ventilating-pipes had been put in, and the drift cleaned out and repaired for a distance of 600 feet. When the break had been reached and temporarily repaired, I deemed it an economical measure to abandon cleaning out and retimbering the remaining 800 feet of drift to the point where the pipe connects with the Union shaft drain-pipe. Instead I am now running a drift from the Union shaft drain tunnel, 1600 level, having first made an uprise of 25 feet. This drift is now extended from the top of the uprise 180 feet, leaving 60 feet to run to connect with 1500 level Sierra Nevada drift at the point where the pipe was repaired. This work will be completed and pipes laid through the new drift by the end of the present month. The machinery is all in good working order. The pumps are running successfully, and the water is down to the lowest point in sump.

UTAH.

FRISCO.—Large quantities of ore are produced daily. The company has 3000 feet of tunnels, shafts, and rises. The vein will average thirty inches all through the mine. The lower tunnel, to tap the vein at a depth of 200 feet deeper than the present vein workings, is in 240 feet, and according to the survey there are only thirty-six feet more to run to strike the vein.

SILVER MOUNTAIN.—The report presented at the annual meeting, held at Salt Lake City recently, shows that the tunnel has a total length of 386 feet. At this point, a fine body of carbonate and galena ore was encountered, varying in width from one to five feet. Assays made show 43 per cent lead and 82⅛ ounces of silver per ton. The composition of this ore is such as to render it an exceedingly fine ore for smelting. Extracting and shipping ore will begin as soon as the developments in the level run from the point where the strike was made are sufficiently advanced.

The purchase of the Dexter mining claim, adjoining the Silver Mountain, for $2000 in money and 500 shares of stock, is also reported. The width of the vein not being determined, and the ore-body being unexplored, I considered it of great importance to secure the adjoining ground before the extent of the strike becomes known, and therefore advised the purchase, which secures the company a large and very valuable tract of additional ground.

TINTIC DISTRICT.

The mining outlook in this district is good, with the exception of the Mammoth property, which is lying idle, not from any fault of the mine, but from bad management. The Eureka mine is turning out about thirty tons of ore per day, which is shipped to Colorado to be smelted. The Beck mine is working about twenty men, and the property is looking fair, and the output is regular. Messrs. Smith & Martin have taken charge of the Red Bird Consolidated at Eureka, and are putting in fine steam hoisting-works, among the best yet erected in the district. The Park property has a concentrator at work. The gangue or waste from this mine is very soft, and easily washes away, leaving the concentrates in the form of lead ore very rich in silver. The Old Chicago has a good strike on it, lately made in the well-defined ledge, which runs about 100 ounces in silver. The Northern Spy is supplying the Tintic mill with ore, and is doing a good business, and has a steady output.

VERMONT.

VERMONT COPPER MINING COMPANY.—The company has now paid one third of the amount due for laborers' wages for the months of May and June. The company as at present organized will not resume work, and the mines will probably be idle the rest of the year or longer.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, July 20.

The mining market has been very dull this week, and the transactions afford little or nothing of interest to note. Eastern Oregon and Sonora have been the most active stocks dealt in, while Horn-Silver has displayed the most strength. Below will be found a complete summary of the market. The total number of sales aggregates 115,559 shares, as against 224,910 last week.

The Comstock shares have been very quiet at weakening prices. Consolidated Virginia, with a fair business, was irregular, selling from 40 @32@35c.; Sierra Nevada sold at $3.90, with a small business. Union Consolidated has been quiet and weak, selling from $5.50@$4.75. Mexican sold at $2.85. Consolidated Imperial records small sales at 4c. Sutro Tunnel has been moderately dealt in at steady prices; it sold at 19@20c.

The Leadville stocks were but moderately dealt in, and were steady. Amie sold from 14@12c., under small transactions. Chrysolite was quiet and steady, selling from $1.15@$1.10. Dunkin sold at 20c. Iron Silver records a fair business at strong prices, selling from $2.95@$3.10@$3. Leadville sold at 50c. Little Chief, with a small business, was irregular, selling from 50 @51c. Little Pittsburg was quiet and a little weak, selling from 70@65c. Climax sold from 13@10c., with small transactions.

The Bodie stocks were very quiet and weak. Bodie Consolidated was weak, a sale of 100 shares being quoted at 69c. Standard had a small business at weak prices, selling from $7@$6.50@$6.63. North Standard sold to-day at 7@8c.

The Tuscarora stocks record small transactions at steady prices. Grand Prize sold at 31c., and Argenta at 35c. Belle Isle was moderately dealt in, and was weak, selling from 45@39c. Navajo records a small business at steady prices; it sold from $2.85@$3. Elko Consolidated was quiet and steady at 22@25c.

In the miscellaneous list, Alice has been quiet and weak at $2.70@$2.50. Caribou records a small business at steady prices, selling from 12@13c. Green Mountain was quiet and irregular, selling at 71@73@72c. Homestake shows some strength under small transactions; it sold from $16@$17. Horn-Silver has been fairly dealt in, and has been quite strong; it sold from $6.88@$8@$7.75. Northern Belle was quiet and steady at $6.25. Robinson Consolidated has been very quiet at steady prices, selling from 61@60c. Sierra Grande was moderately dealt in and was weak; it sold from $1.25@$1. Stormont sold from 48@37c., with a small business.

Alta-Montana was quiet at 2c. Bradshaw records a fair business at weakening prices; it sold from 28@25c. Caledonia was quiet and steady at $1.15. Decatur sold from 3@5@4c., with small transactions. Eastern Oregon was actively dealt in at strong prices; it sold from 72@76c. Oriental & Miller was quiet and steady at 14@13c. Sonora Consolidated was very active at irregular prices; it sold from 29 @25c.

A suit has been brought to dissolve the American Mining Stock Exchange, and for the distribution of the insurance and gratuity fund to its members. The Exchange gave up its rooms at 63 Broadway last May, and since that time its members have disbanded and joined other exchanges. Action is now brought for the purpose of having a receiver appointed to take possession of the fund, which amounts to about $10,000.

The Governing Committee of the New York Mining Stock and National Petroleum Exchange has reduced the fee for transferring seats in the Exchange from $100 to $25.

DIVIDENDS.

The Father de Smet Consolidated Mining Company, of Dakota, has declared its twenty-eighth dividend of twenty cents per share, payable July 31st.

PIPE LINE CERTIFICATES.

As will be seen by our table below, this week has been a very active one in the oil market. A decline set in in the early part of the week, and was only checked to-day, when strong figures prevailed. There was no news of importance from the oil regions to affect the market.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
July 14.....	$1.08	$1.08¼	$1.03⅞	$1.04⅜	3,646,000
16.....	1.04¼	1.04¼	1.00⅜	1.02¾	5,314,000
17.....	1.03⅛	1.04⅛	1.01⅛	1.01⅜	3,656,000
18.....	1 01⅛	1.01¾	.97⅜	1.00⅛	4,645,000
19.....	1.01	1.02⅛	.99	1.01⅛	3.094,000
20.....	1.02	1.06⅛	1.01⅜	1.06⅜	3,319.000
Total sales.....					23,674,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. July 13.	July 14.	July 16.	July 17.	July 18.	July 19.
Albion	.....	.....	.....	.....	.....	.....
Alpha	.2	2⅛	2⅛	2¼	2¼	.....
Alta	.65	.70	.70	.70	75	.70
Argenta	.05	.05	.05	.05	05	.05
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	1¼	.....	.....	1¼	1¼	.....
Belle Isle	.35	.....	.....	.40	.40	.40
Best & Belcher	4¼	4⅜	4⅜	4⅛	4⅛	4¼
Bodie	.80	.75	.75	.60	.....	.70
Bullion	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....
California	.10	.15	.15	.10	.10	.10
Challar	3⅝	3¾	3¾	3¾	3⅝	3⅝
Con. Virginia	.40	.40	.40	.35	.40	.40
Crown Point	1⅜	1½	1½	1⅜	1¼	1¼
Elko Cons	.....	25	25	25	.....	25
Eureka Cons	5	4¾	4¾	4⅝	4½	4¾
Exchequer	.....	.....	.....	.....	.....	.....
Gould & Curry	2⅜	2⅛	2⅛	2⅞	3	3
Grand Prize	.05	.05	.05	.....	.05	.05
Hale & Norcross	6¼	6⅝	6⅝	6½	6½	6⅝
Independence	.....	.....	.....	50	.....	.40
Martin White	.....	.....	.....	.....	.....	.....
Mexican	3	3	3	2¾	2¾	2¾
Mono	.....	.....	.....	.....	.....	.....
Mount Diablo	.....	5	5	5½	.....	.....
Navajo	3	2⅞	2⅞	3⅛	3⅛	3
Northern Belle	.....	.....	.....	.....	.....	.....
North Belle Isle	.....	.....	.....	.....	.....	.....
Ophir	2½	2½	2½	3⅜	2⅜	2⅜
Overman	.....	.....	.....	.....	.....	.....
Potosi	1½	1⅝	1⅝	1½	1½	1½
Savage	2¼	2½	2½	2¼	2¼	2⅜
Scorpion	.....	.....	.....	.....	.....	.....
Sierra Nevada	4	4	4	3⅞	3¾	3⅝
Silver King	.....	.....	.....	.....	.....	.....
Tip-Top	.....	.....	.....	.....	.....	.....
Union Cons	5	5	5	4⅝	4½	4⅝
Utah	2¾	2¾	2¾	2⅝	2½	2½
Wales Cons	.....	.....	.....	.....	.....	.....
Yellow Jacket	3⅞	4	4	3⅞	3¾	3¼

The following are the financial balances of the various mining companies on July 1st:

CASH ON HAND.

Alta	$12,131.81	Hale & Norcross	$870.43
Alpha Con	4,827.90	Jackson	2,591.38
Andes	937.15	Mono	3 319 35
Argenta	1,723 21	Mexican	7,632.39
*Belcher	26,724.26	Northern Belle	53,724.76
Best & Belcher	22,568.53	Ophir	19,684.22
Benton Con	10,056.68	Occidental	6.578.09
Bulwer	2.691 48	Silver Hill	2,562.34
Bodie Con	38.143.60	Sierra Nevada	36,045.60
Con. Imperial	7,602 83	Summit	1,372.19
Crown Point	23,229.18	Standard	116,03 .27
Challenge Con	5.117,73	Savage	12,234.33
Con. Virginia	20,824 34	Tioga Con	913 45
California	683.10	Utah	5,388.43
†Day	1,855.38	Union Con	22.173.42
Gould & Curry	134.92		

INDEBTEDNESS.

Grand Prize	$23,282.71	Martin White	$4,258.69
Lady Washingt'n	1,942.26		

Albion, exact amount not yet known; approximates $260,000.

* Belcher due Sutro Tunnel Company. $10,920.
† Bills payable, $91,151.81.

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, July 19.

The market has lapsed into a state of extreme dullness again, the transactions being almost entirely confined to the stock of one mine on the list, namely, Quincy, which declined from $50@$48, with some pressure to sell the stock. Only one share of Calumet & Hecla changed hands, and that at $239, ex dividend $5, an advance of $1 over last sale. A small lot of Osceola sold at $21, and this comprises all the transactions in the copper-mining shares for the week. The brokers in these specialties certainly have reason to complain of the stupidity of the market, and are anxiously looking for a better time coming.

In silver stocks, with the exception of Silver Islet, there is not much change. The report from Silver Islet of a rich strike in the 1160 level has brought some buying orders, and the stock advanced from $4@$7½, with sales of about 600 shares. Sullivan declined from $1¼@75c., and at the Mining Board, sales were made at 62½c., seller 60 days. Catalpa and Crescent, both dull on the poor showing for June; the former declined from 57½@45c., the latter sold at 25c. Bonanza declined from $2¼@$2.

At the Boston Mining Exchange, there is less activity than last week, and prices are a shade lower. Bowman Silver declined from 27@21c., and Massachusetts & New Mexico got back to its old price again, 7c., sales. There was considerable doing in railroad stocks, Toledo, Cincinnati & St. Louis being most prominent, with sales of over 1000 shares at $3⅛@$2⅞, the latter figure being to-day's price.

3 P.M.—At the afternoon Boards, there was little doing. We note sales of Bonanza at $2. Quincy, at $48. Huron, at $1½. Silver Islet was offered at $7; no bid. Catalpa, 47½c. bid. San Pedro, 27½c. bid. $240 was bid for Calumet & Hecla. Franklin offered at $10. Pewabic, $3½ bid; and Atlantic, $11 bid.

BULLION MARKET.

NEW YORK, Friday Evening, July 20.

As foreshadowed in our postings of the 13th inst., our silver market has declined, and is weak at the figures of annexed table.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
July 14	50⅜	110½	July 18	50 5-16	110
16	50⅜	110⅛	19	50 5-16	110
17	50⅜	110⅛	20	50 5-16	110⅞

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29-29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of June.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont	.....	$398,410
*Alta-Montana, G. L. S.	"	.....	$10.625
*Belmont	"	.....	17,775
Bodie, G. S.	Cal	18,045	119,535
Bodie Tunnel, G	"	3,195	54,642
*Bonanza King, G.	"	67,573	334,223
*Boston & Montana, G.	Mont	.....	72,318
*Central Arizona, S.	Ariz	.....	35,845
*Christy, S	Utah	.....	117,736
*Chrysolite, S. L	Colo	§43,545	236,516
Cons. Bobtail	Colo	.....	18,723
*Contention, S	Ariz	81,594	567,428
Crescent, G	Cal	.....	13,000
*Custer, G. S.	Idaho	.....	43,572
*Deadwood-Terra, G.	Dak	.....	172,277
*Derbec Blue Gravel, G. S.	Cal	.....	44,729
Evening Star, S. L	Colo	.....	47,061
*Father de Smet, G.	Dak	25,038	178,163
*Frisco M. and S. Co., G. S. L.	Utah	.....	§77 084
Gunnell, S	Colo	.....	58,828
*Head Center Cons	Ariz	.....	8,109
*Head Center and Tranquillity	Ariz	.....	42.601
*Hecla Cons., G. S.	Mont	.....	203,922
*Homestake, G	Dak	.....	419,148
*Hope, S	Mont	.....	41,963
Horn-Silver, S. L	Utah	264,000	1,547,000
Idaho, G	Cal	.....	88,642
*Independence, G. S.	Nev	.....	32.991
Iron Silver, S. L	Colo	.....	503,831
*Jocui-tita, S	Mex	.....	‡228,022
*Kentuck, G. S	Nev	.....	10,393
*Lexington, S	Mont	107,655	638,488
*Little Pittsburg, S. L	Colo	7 451	35,645
*Marguerite, G	Cal	6,998	45,745
*Martin White, G. S	Nev	.....	136.317
Morning Star, S. D	Colo	.....	84,428
*Moulton, G. S.	Mont	.....	123,288
Mount Diablo	Nev	60,512	187.823
*Navajo, G. S.	"	.....	343,962
*North Belle Isle	"	.....	1.953
Northern Belle, S	"	7,381	395,906
*Ontario, S. L	Utah	87,652	1,038,687
*Oxford, G	N. S	7,076	35,255
*Phœnix, G	S. C	2,500	7,700
*Pinal Cons., S. L	Ariz	23,218	186,618
*Satemo, G	N. S	.....	2,500
*Silver Bow, G. S	Mont	.....	101,241
Standard, G	Cal	133,026	575,822
Star, S	Nev	.....	27,095
*Stormont, S	Utah	.....	95.658
Syndicate, G	Cal	9,043	29,116
Tintic M. and M. Co	Utah	6,969	14,601
*Tip Top, S	Ariz	.....	‡22,983
*Tombstone, G. S.	"	91,400	414,239
Wyoming Cons	Cal	.....	31.541
Yellow Jacket, S	Nev	10,594	193.658
Total amount of shipments to date			$10,685,671

* Official. †Net value. ‡ Assay value. §Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended July 20th, as compiled from various sources, amounted to $131,262, as against $176,000 reported for the previous week. The receipts from January 1st, 1883, to date are $6,295,474.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended July 14th	$278,469
Corresponding week last year	225,000
Since January 1st, 1883	7,069,935
Corresponding period last year	36,372,334

Imports.

Week ended July 14th	$158,780
Corresponding week last year	16,609
Since January 1st, 1883	7,136,602
Corresponding period last year	2,021,989

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank lost £87,000 bullion, and the proportion of its reserve to its liabilities was reduced from 42 5-16 to 41 7-16 per cent, against 40 3-16 per cent at this date last year. June 19th, the bank gained £17,000 bullion on balance. The weekly statement of the Bank of France shows losses of 1,450,000 francs gold, and 2,275,000 francs silver.

METALS.

NEW YORK, Friday Evening, July 20.

Copper.—We confirm the favorable indications of last week, though it can not be said that as yet they have had any effect upon values. There is less pressure to sell than there has been for a long time, and inquiries for Lake from people who have not been supplied under the pool sales are getting more numerous. Odd lots are picked up for export at 15@15⅛c., which is the ruling quotation, while other brands are 14@14⅛c. The English market has retained its steadiness, although some of the merchants' circulars are bearish in tone, probably in opposition to the parties who are apparently getting ready for a squeeze, should business revive in the fall. London cables £63 10s. for Chili Bars.

To-day, the members of the Exchange took a turn at copper, and sales of 50,000 pounds of Lake at 15c. and 100,000 pounds at 15⅛c., and 150,000 pounds of Baltimore at 14⅛c. and 50,000 pounds at 14c. were recorded.

Tin.—Outside of the Exchange, where 350 tons of tin were sold, the business of the week has been quiet. The spot is concentrated in a few hands, and we quote spot Straits, round lots, 21¼@21⅝c. London cables £93.

Lead.—In the beginning of the week, 400 tons of Newark sold at 4·30c., and 400 tons of St. Joe lead at 4·32½c., and since then there have been small sales at 4·35c., for Common, which we quote. The large holders, among them the Richmond, hold firmly, and have not been sellers, and while there is no active demand, the offerings, too, are small. Refined may be nominally quoted 4·35@4·40c., nothing being done.

The telegraphers' strike has prevented the receipt of our usual dispatches from St. Louis and Chicago. England cables £12 10s. for Spanish.

Spelter.—This metal appears unable to rally, and we note sales at 4⅝c., a figure at which even some of our Eastern works must find it hard to compete, while Europe is out of the race entirely. England cables £15 5s. for Silesia.

Antimony.—There is nothing special to note. Quotations are 9¼@9⅝c. for Hallett's, and 10¼@10⅝c. for Cookson's, advices from England being lower.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, July 20.

Telegraphic dispatches are at hand, announcing the failure of the Manchester Iron and Steel Company, at Pittsburg.

American Pig.—The firmness which we have so frequently dwelt upon, so far as prime brands of No. 1 is concerned, continues, while No. 2 and Gray Forge are quiet and easy. Furnace agents report a fair business, the Thomas Iron Company alone having contracted for 3000 tons at full figures.

At the Metal Exchange the following sales have been reported during the week:

Monday, 100 tons No. 1, October delivery, at $22.50, and 200 tons at $22.37½. Tuesday, 500 tons at $22.25, 200 tons at $22.37½, 400 tons at $22.12½, and 1200 tons at $22, all October delivery, and 100 tons at $22, 200 tons at $21.87½, and 200 at $21.75, all September delivery. On Thursday, 200 tons October were sold at $22.12½, and to-day 300 tons, November delivery, from $22.50 down to $22.25. We quote at tide-water, spot, according to brand, $21.75@$23 for good to choice No. 1, $19@$20 for No. 2, and $18.50@$19.50 for Gray Forge. Nothing has been done in Bessemer pig. England cables 50@51s. Spiegeleisen is quiet, with 20 per cent quoted $30.50@$31.

Scotch Pig.—There has been an advance in freights, which are now quoted by cable 9@10s. from Glasgow to this city, which induces importers to assume a firmer attitude, though business is not large and arrivals continue light. We quote ex ship: Coltness, $23.75@$24; Langloan, $23.75@$24; Summerlee, $23@$23.50; Dalmellington, $21@$21.50; and Eglinton, $21.

At the Exchange, the following cable quotations were received: Coltness, 61s. 3d.; Langloan; 60s.; Summerlee, 57s. 6d.; Gartsherrie, 57s. 6d.; Glengarnock, at Ardrossan, 55s.; and Eglinton, at Ardrossan, 49s. 6d. Warrants to-day were 47s. 4d.

Rails.—We hear of sales aggregating 15,000 tons, partly for early delivery, at $38½ at mill. There is considerable inquiry for small lots for such delivery, which has reacted somewhat favorably upon sales for fall and early winter. England is unchanged.

Old Rails.—There are several good-sized lots in market without eliciting bids higher than $21@$22.

Scrap.—Old material of this description is dull and lifeless at $22@$22.50 ex ship.

Philadelphia. July 19.

Eastern Pennsylvania iron quotations stand as recorded last week, and transactions up to present writing, for this week, show firmness in all except inferior makes of crude iron. Consumers are ordering quite freely, for near-by use, but can not be induced to place orders for remote delivery, as they look for a further weakness before the opening of the regular fall trade. Several furnaces are preparing to go into blast, and, should there be any material increase in the output, the present upward tendency will be arrested and uncertainties and fluctuations gather around the trade. The present output is apparently sufficient to meet actual requirements, and firm prices can be held. Special No. 1 Foundry sold to-day at $23.50, and all furnaces are well sold up for the summer output. The standard brands are held with considerable firmness, although occasional transactions have leaked out at lower than quoted rates. Very little good No. 1 has been sold below $22, and some firms hold at $22@$22.50. No. 1 iron, no better than No. 2, is sold at $21.50. No. 2 averages $20. A number of transactions, for ordinary makes were closed at $19.50. The mill-owners are preparing to resume, and some few orders for 500-ton lots have been placed at from $17.50@$18 at furnace; $17 iron is to be had, but there is less of it offering than two or three weeks ago.

There is some little inquiry for Scotch iron, but very little is doing. Bessemer iron is dull, and quoted nominally at $21.50, but large consumers will not pay that price. A good deal of ore is arriving.

Spiegeleisen is quoted, $31 for 20 per cent; with buyers waiting, at $30.

Sales of Muck Bars have taken place between $34 and $35, with a tendency toward the lower figure. Best Charcoal Blooms command $61, and small sales have been heard of from this down to $56, and from $47 to $50 for different makes of anthracite.

Merchant Bars are held at 2·20c., but the business done below this is increasing. In view of the increased output, buyers are more exacting, and it is harder to place orders at 2·20c. Small lots are 2·25c. Stores are doing a fair business. Country mills are selling their inferior makes all the way from 1·90@2·10c.

Nails.—Inquiries for nails begin to improve, and prices remain substantially as heretofore quoted, $3 to $3.15. The Western suspension will help demand here. Fall requirements will be heavy. Offers of less than $3 have not been accepted.

In structural iron, plate and tank, and all kinds of sheet-iron, a fair movement is reported, though very little has been done in the way of anticipating September requirements.

Steel rails are quoted $38@$39, and thus far it appears that makers have the advantage in negotiations. Offers of $36@$37 have terminated in orders at $37.50 and $38. Western mills are taking large orders at $39@$40. The demand for railroad material is satisfactory, and prices are strong.

Pittsburg. July 19.

The improvement in the iron market which was noted last week continues, with the result of drawing out a good deal of inquiry during the past few days, and a moderate number of orders for immediate delivery.

The fact is more clearly brought out that supplies in consumers' hands are lower than prudence permits, and some of the larger consumers have placed orders for two or three weeks' requirements, intending to await further developments. The holders of the Marshall iron have quieted the market by the assurance that they will not unload it in bulk, but will dispose of it in a manner that will not unduly influence the market.

The nail men have shut down for a month, in order to keep prices where they have been for ninety days. Stocks are low in first and second hands, and they will be able to maintain prices where they are by the present policy. Steel mills are partially idle for repairs. The supply of all kinds of steel is heavy, and prices weak. Inquiry for old rails is active and negotiations for large lots are pending. Bessemer iron is quoted at $21.50. No. 1 Foundry, $19@$21. Old Rails, $22.50. Red Short mill iron, $18.50. Warm-Blast Charcoal, $26. Cold-Blast, $28@$30. Muck Bars, $34.50. Demand light. Merchant Bar, 2c. in small lots and 1·90c. shaded in large lots. Nails, $2.90. Wrought Pipes, $70 and $80. Track supplies are in active demand and unchanged. Crop-Ends, $25. Scrap Iron is in fair demand at $22 for Common, and $23@$24 for Selected.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, July 20.

Anthracite.

As anticipated, the month continues to be a very dull one. There is considerable coal moving, to fill June orders, but new business is very small in volume and is generally made on the basis of June prices, lower figures being more frequent than higher ones, practically no coal selling at circular rates, except the best Lehigh coals.

News from the West, which is now the principal point of interest, is not particularly encouraging, though no signs of any sharp competition appear on the surface. The Executive Committee of the Western Association met last week at Buffalo, to straighten out some of the irregularities in that market.

President Roberts, of the Pennsylvania Railroad, called a conference at Philadelphia, on Friday last, of the Western shippers of anthracite coal over his road. The probable effect upon the Westward coal tonnage of the Pennsylvania Railroad of the completion of new connections of coal roads to the West was fully discussed, and it is stated that the railroad officials showed their determination not to permit any diversion of trade, but to do all in their power to keep it in its present channel.

It is not believed that the heavily increased tonnage can be placed on the Western markets without some struggle, and it is feared that, if prices should suffer too much there, while well maintained here, the diversion to the seaboard might demoralize the trade

John H. Jones, official accountant, has just published the following statement of the anthracite coal tonnage for June, 1883. The figures include the entire production of anthracite coal, excepting that

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	July 14.		July 16.		July 17.		July 18.		July 19.		July 20.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon					2.70	2.50							350
Amie Con., Co			.13		.14	.12					.12		3,900
Argenta, Ne					.35								500
Bar. & Walker, Ut													
Bassick, Co													
Belle Isle, Ne	.41				.45				.39				1,200
Bodie Cons., Ca							.69						100
Breece, Co													
Bulwer, Ca													
California, Ne													
Cal. & Hecla, Mich													
Carbonate Hill													
Caribou Con., Co	.13	.12			.13		.13		.13				3,000
Chrysolite, Co	1.15		1.15	1.10	1.15						1.10		2,400
Climax, Co													
Cons. Va., Ne					.40	.37			.36	.35	.35	.32	4,600
Crown Point													
Deadwood-Terra, Dk													
Dunkin, Co					.20				.20		.20		1,800
Eureka Cons., Ne													
Excelsior, Ca													
Father de Smet, Dk	4.00												100
Findley, Ga													
Gold Stripe, Ca													
Gould & Curry, Ne													
Grand Prize, Ne					.31								700
Great Eastern, Dk											.01		500
Green Mountain, Ca			.71		.73	.72							2,000
Hale & Norcross, Ne													
Hall-Anderson, N. S													
Hibernia, Co													
Homestake, Dk					16.00				17.00				600
Horn-Silver, Ut	7.00				7.25	7.13			7.00	6.88	8.00	7.75	1,740
Hukill, Co													
Independence, Ne													
Iron Silver, Co	3.00	2.95					3.00		3.00		3.10	3.00	3,830
La Plata, Co													
Leadville C., Co					.50								500
Little Chief, Co	.50				.53	.51							1,700
Little Pittsburg, Co	.70		.70	.65					.70	.65			900
Martin White, Ne													
Moose, Co													
Navajo, Ne					3.00	2.85					3.00	2.90	1,700
Northern Belle, Ne					6.25		6.25						300
North Belle Isle, Ne													
Ontario, Ut													
Opnir, Ne													
Plumas, Ca													
Prussian, Colo													
Quicksilver Pref., Ca													
" Com., Ca							8.00	7.50					200
Rising Sun, Ca													
Robinson Cons., Co	.61				.61	.60			.60				6,800
Saint Joseph's Lead													
Savage, Ne	2.20												100
Sierra Grande, N. M	1.25				1.15		1.15	1.10	1.05		1.05	1.00	3,700
Sierra Nevada, Ne					3.90								150
Silver King, Ar									5.50				100
Spring Valley, Ca													
Standard, Ca			6.75				6.50		7.00		6.63	5.50	599
Stormont, Ut	.48				.37								1,700
Tip Top, Ar													
Tombstone, Ar													
Vizina, Ar													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	July 14.		July 16.		July 17.		July 18.		July 19.		July 20.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance													
Albion													
Alta													
Alta-Montana, G			.02		.02						.02		5,400
Am. Flag, s													
Barcelona, G													
Bear Creek													
Bechtel Con., G													
Belvidere													
Best & Belcher, G. S													
Big Pittsburg, S. L													
Bradshaw, S									.28	.23	.26		3,000
Buckeye													
" pref													
Bull-Domingo, S.L													
Bye and Bye													
Calaveras, G													
Clav'r'a W. & M. Co													
Cal., S. H., G									1.15		1.15		300
Central Ariz'na, S													1,100
Cherokee, G													
Climax, Co	.13	.12	.11	.10							.10		1,700
Cons. Imp'ri'l, G.S											.04		900
Crowell, G													
Dahlonega, G													
Decatur	.03								.03				
Dunderberg													
Durango, G													
Eastern Oregon	.73	.72	.73	.72	.75	.73	.75				.75		16,100
Elko Cons	.22				.22		.25						600
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G													
Granville, G													
Harlem M. & M. Co													
Hortense, S													
Imperial													
Lacrosse, G									.11				1,600
Lucerne													
Mariposa Pref., G													
" Com., G													
Mexican, G. S	2.85												50
Miner Boy													
Mono													
North Standard, G													
N. Horn-Silv'r, S													
Pri'n'l & Miller, S	.14	.13					.14				.13		3,400
Parnell			.40										200
Quartz Creek													
Rappahannock, G													
Red Elephant, S													
Ruby, of Arizona													
Silver Cliff, S									.15				800
Sonora Con	.27	.25	.29	.27	.27	.25	.28	.25	.26	.25	.16		19,300
South Bodie, G											.27	.25	
South Bulwer, G													
South Hite											.08		100
South Pacific													
State Line, 1 & 4, S													
" Nos. 2 & 3, S													
Sutro Tunnel	.20				.20		.20		.20		.20	.19	10,500
Taylor Plumas													
Union Cons, G. S	5.50				5.00						4.75		550

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 45,659. Non-dividend shares sold, 69,900.

BOSTON MINING STOCKS.

	July 13.		July 14.		July 16.		July 17.		July 18.		July 19.		Sales.
	H.	L.	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez													
Amie													
Atlantic													
Aztec													
Bodie Con													
Bonanza D	2.25				2.13		2.13	2.00			2.00		450
Bowman Sil	.28	.26	.26				.22	.21	.22	.21			12,600
Bruns. Ant													
Bulwer													
California													
Cal. & Hec					239						241		6
Catalpa			.58		.50		.50		.45				1,000
Central Ariz													
Climax													
Co. Virginia			.45										200
Copper F'lls													
Copperop													
Crescent	.25												200
"Cusi"													
Decatur													
Deer Isle													
Denver City													
Douglas			.95										100
Duncan													
Dunkin									.26	.24			500
Empire							.20						265
Eureka Con													
Franklin									10.00				25
Hancock G													
Harshaw													
Huron											1.50		350
Independ'ce													
Indian Q'n													
Mammoth													
Mass. & N. M	.09		.08				.07		.07				14,250
Milton													
Napa													
National													
North. Belle			6.75						6.38				35
Ontario													
Osceola							21.00	19.50					16
Penn-Breck													
Pewabic													
Pine Tree													
Plymouth													
Quincy	49.00	48.00	49.00		48.63	48.25	48.25		48.13	48.00	48.60	47.50	217
Ridge													
Robinson									.62				170
San Pedro									.30				200
S'ra Nevada									4.00				50
S'ra Grande													
Silver Islet	5.50	5.00							7.50	7.00			615
Silver King													
Simpson Gd													
So. Pacific													
Standard							6.75						20
Sullivan	1.00	87½	.75		.75				.75				1,320
Sutro Tun	.21								.21				700
Sycamore													
Twin Lead	.15	.14	.15				.15	.14					3,700
Vizina													

PHILADELPHIA MINING STOCKS.

	July 13.		July 14.		July 16.		July 17.		July 18.		July 19.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons													
Argent	.18		.12	.18			.19	.17	.17	.16			15,700
Arizona So			.03										3,000
Battle Mt													
Buena													
California													
Calista													
Chrysolite			.11	.10							.12	.11	44,400
Cincinnati			.19				.17		.19		.19	.18	17,000
Comprom'e													
Contention													
Con. Virg													
Dauntless													
Del Monte	.08	.02	.02				.02						5,700
Denver City													
Eureka													
Girard	.06	.04	.04								.03		4,700
Governor			.06						.05				1,500
Grand Uni'n	.18		.18						.18				7,500
Green Mt													
Gunnison	.42½		.42½				.40		.40		.40		6,300
Homestake													
Horn Silver													
Iowa Gulch	.07	.06	.08				.08	.07	.08	.07	.07		33,500
Iron Silver													
King Bul'on													
Ledger Con													
Little Dia'd			.06						.07				4,200
Little Maid									.04				1,000
Little Pitts													
L'g & D'y H													
Montana													
Mt. Sheridan	.04		.03										2,000
Navajo													
North'n B'l													
Orion													
Orion Pref													
Palmetto E													
Pembina													
Penn-Breck	.10		.09				.10		.09		.10		14,900
Permanent													
Pizarro													
Pizarro Ex													
Potosi													
Rara Avis	.30								.30				6,600
Rara Avis E	.09	.08	.09				.09		.06		.09		17,300
Record													
Rico Pion'r													
Sierra Apac									.22	.20	.20		700
Sierra Be. le							.55		.55		.52½		1,800
Sierra G'nde	1.20	1.17½	1.15				1.25	1.12½	1.12½	1.07½	1.07½		23,500
Sierra Nev													
Silver Cord			1.70	1.67½									2,300
Silver King													
Silv'r Plume	.01										.02		3,000
Sonora Con													
Standard													
Sultana							.03		.04				3,600
Sutro Tun'l													
Tombstone	1.00	.97½					.97½				1.00	.97½	2,100
Victor							.02						3,500
Yale Mt													

consumed by employés, and for steam and heating purposes about the mines :

	June, 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.	1,026,526	3,645,255	2,906,674	I. 738,581
Central RR. of N. J.	*.....	1,745,399	1,888,373	D. 142,974
Lehigh Valley RR.	†529,927	2,848,728	2,619,692	I. 229,036
Del., Lack. & W. RR	415,031	2,217,068	2,019,258	I. 197,810
Del. & Hud. Canal Co.	‡287,347	1,531,161	1,365,371	I. 165,790
Penna. RR.	253,672	1,208,969	1,056,800	I. 152,169
Pa. Coal Co.	124,516	653,183	604,880	I. 48,304
N. Y., L. E. & W. RR	33,560	161,004	106,804	I. 54,200
Total	2,670,581	14,010,767	12,567,852	I. 1,442,916

* Included in tonnage of Philadelphia & Reading Railroad.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 5718 tons.

‡ In addition, there were 47,377 tons transported from mines by Delaware & Hudson Canal Company, during June, which is included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, June 30th, 1883, was 592,309 tons ; on May 31st, 1883, 645,377 tons ; decrease, 53,068 tons.

Bituminous.

There is absolutely nothing to report in the bituminous market, which remains stagnant with low prices induced by the sharp competition among producers, the rivalry of the two leading regions, and the efforts of new classes of coal to gain a foothold in the market. Quotations remain nominally unchanged.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended July 14th, and year from January 1st :

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	51,063	1,841,418	81,938	1,684,190
D. L. & W. RR. Co.	69,472	2,333,724	105,979	2,200,224
Penna. Coal Co.	22,233	659,925	37,153	650,245
L. V. RR. Co.	*	525,965	41,546	569,744
P. & N. Y. RR. Co.	4,036	104,054	4,173	102,903
C. RR. of N. J.	*	1,202,078	56,152	1,180,658
Penna. Canal Co.	6,634	172,371	13,228	196,966
North & West Br. RR.	15,358	245,612	.....	.....
	168,796	7,085,147	340,169	6,584,959
Lehigh Region.				
L. V. RR. Co.	*	2,333,044	111,856	2,360,031
C. RR. of N. J.	*	1,126,849	56,660	1,082,886
S. H. & W. B. RR.	2,561	29,656	.....	20,000
	2,561	3,489,589	168,516	3,462,917
Schuylkill Region.				
P. & R. RR. Co.	109,141	3,401,305	161,071	3,239,487
Shamokin & Lykens Val.	29,236	704,215	10,581	585,209
	138,377	4,105,520	171,652	3,824,696
Sullivan Region.				
St Line & Sul. RR. Co.	896	31,996	1,296	29,071
Total	310,630	14,712,252	681,633	13,901,634
Increase	.....	810,618	.....	.....
Decrease	371,003	.....	.....	.....

* Reports for week ended July 14th have not been received.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878 ..... 8,028,518 tons.
" " " " 1879 ..... 13,120,529 "
" " " " 1880 ..... 11,107,215 "
" " " " 1881 ..... 13,663,325 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 424,253 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended July 14th :

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	2,300	48,950	38,547
Coal for shipment at South Amboy	9,738	415,168	431,252
Coal for distribution	11,805	405,712	375,177
Coal for company's use	3,229	77,723	68,252
Total	27,072	947,553	923,228
Increase	.....	34,325	.....
Decrease	.....	.....	.....

The Production of Bituminous Coal for the week ended July 14th was as follows :

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs	59,808	1,310,353
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	4,723	168,209
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	3,563	103,339
East Broad Top	688	23,811
Clearfield Region, Pa.		
Snow Shoe	4,025	128,010
Tyrone and Clearfield	62,709	1,477,264
Alleghany Region, Pa.		
Pennsylvania RR.	7,312	236,089
Pittsburg Region, Pa.		
West Penn RR.	8,150	234,972
Southwest Penn. RR.	1,688	57,822
Penn & Westmoreland gas-coal, Pa. RR	22,208	723,355
Pennsylvania RR	10,865	271,837
Total	185,739	4,635,061

The Transportation of Coke over the Pennsylvania Railroad for the week ended July 14th, and year from January 1st :

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	640	50,993
West Penn. RR	2,040	56,648
Southwest Penn. RR	42,569	1,088,389
Penn. & Westmoreland Region, Pa. RR	3,990	121,186
Pittsburg, Penn. RR	32	501
Snow Shoe (Clearfield Region)	173	10,931
Total	49,444	1,328,648

Circular Prices of Anthracite Coal Delivery, f. o. b., at Tide-Water Shipping Ports, per ton of 2240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.	$	$	$	$	$	$
Pittston at Newburg	3 95	3 95	3 90	4 00	4 20	4 25
Scranton at Hoboken	3 90	3 90	3 90	4 15	4 45	4 55
Lackawanna at Weehawk'n	3 90	3 90	3 90	4 15	4 45	4 60
Wilkes-Barre at P. Johnston	3 90	3 90	3 90	4 15	4 45	4 45
Plymouth R. A. at P. John.	.....	4 25	.....	4 45	4 90	4 50
LEHIGH COAL.						
Honey Brook at Port John.	5 00	4 25	.....	4 40	4 45	4 45
Fulton at South Amboy	5 25	4 40	.....	4 40	4 30	4 40
U. L. & Coun. Ri'ge at Eliz'pt	.....	.....	.....	.....	.....	.....
SCHUYLKILL COAL. *At Elizabethport.*						
Hard White Ash	4 85	4 85	.....	4 25	4 60	4 35
Free-Burning White Ash	.....	3 90	.....	4 15	4 60	4 35
Schuylkill Red Ash	.....	.....	.....	4 25	4 80	4 35
Shamokin	.....	.....	.....	4 40	4 80	4 45
Lorberry	.....	.....	.....	4 55	5 00	4 45
Lykens Valley (Brookside).	.....	.....	4 85	5 15	5 50	5 15
At Port Richmond, Philadelphia, for shipment to points beyond Capes of the Delaware.						
Hard White Ash	4 50	4 50	3 75	3 90	4 25	4 00
Free-Burning White Ash	.....	3 55	3 55	3 80	4 25	4 00
Schuylkill Red Ash	.....	.....	.....	3 90	4 45	4 00
Shamokin	.....	.....	.....	4 05	4 45	4 10
Lorberry	.....	.....	.....	4 05	4 55	4 10
Lykens Valley (Brookside)	.....	.....	4 35	4 65	5 00	4 65

Jermyn coal, at Hoboken, is quoted per ton of 2240 lbs.: Lump, $3.90; Steamer, $3.90; Broken (grate), $3.90; Egg, $4.15; Stove, $4.45; Chestnut, $4.45; Chestnut, No. $23.

Horsford's Acid Phosphate
For Women and Children.

Dr. Joseph Holt, of New Orleans, La., says : "I have frequently found it of excellent service in cases of debility, loss of appetite, and in convalescence from exhaustive illness, and particularly of service in treatment of women and children."

DIVIDENDS.

OFFICE OF QUINCY MINING COMPANY.

NEW YORK, July 11, 1883.

DIVIDEND NO. 30.

THREE DOLLARS AND FIFTY CENTS ($3.50) per share will be payable August 15th next, to holders of record 24th inst. Massachusetts holders will be paid at the office of Mr. N. H. Daniels, 2 Change Avenue, Boston. By order of

WILLIAM ROGERS TODD, Treasurer.

SAN FRANCISCO, July 13, 1883.

THE FATHER DE SMET CONSOLIDATED GOLD MINING COMPANY has declared

DIVIDEND NO. 28,

of TWENTY CENTS per share, payable at the office of Laidlaw & Co., No. 14 Wall Street, on the 31st inst.

Transfer-books will close on the 23d inst.

H. DEAS, Secretary.

STEAM PUMPS.

FOR SALE.—A large number of Steam-Pumps of all makes, and ranging in size from small tank or boiler feeds up to very heavy service machines.

While the stock lasts, good bargains are open for Miners, Water-Works, Rolling-Mills, Furnaces, or any one needing to move fluids by steam. Call upon or address

JOHN A. HINCKLEY, Purchasing Agent of
THE UNITED PIPE LINES, OIL CITY, PA.

SMELTING-WORKS FOR SALE.

The New England Smelting-Works, on Chelsea Street, East Boston, are now offered for sale.

There are two buildings, each 50 feet square, a large refinery, nearly the same size, and an office ; two copper and two lead furnaces; an engine, a crusher, lead kettles, cupel furnace, and all necessary tools and appliances, platform scales, etc., for carrying on the smelting business.

The land is 200 feet front, running back over 800 feet to tide-water.

Price low, and terms to suit the purchaser. Must be sold. Apply to

A. R. BROWN, Jr.,
38 Water Street, Room 1,
BOSTON, MASS.

New York, West Shore & Buffalo Railway

TO AND FROM

SARATOGA,

Via West Shore Route.

GOING NORTH.

STATIONS.	53 Phila. Express.	55 Saratoga Express.	Washington & Saratoga Limited.	3 Albany Express.
L've WASHINGTON, P. RR.	.....	8 00 A.M.	9 30 A.M.	.....
" BALTIMORE, P. RR.	.....	9 25	10 50	.....
" PHILADELPHIA, Broad St. Station.	8 20 A.M	1 00 P.M.	1 30 P.M.	.....
" LONG BRANCH, P. RR.	9 20	.....	.....	.....
" BROOKLYN, foot Fulton st.	10 40	3 20 P.M.	3 20 P.M.	3 40 P.M.
" NEW YORK, Desbrosses St.	11 10	3 50	3 50	4 10
" NEW YORK, Cortlandt St	11 10	3 50	3 50	4 10
L've Jersey City, P. RR. Station	11 22 A.M.	4 02 P.M.	4 02 P.M.	4 24 P.M.
Arr. Cranston's	1 08 P.M.	f 5 34	f 5 34	6 07
" West Point	1 19	f 5 36	f 5 36	6 09
" Kingston (Catskill Mountains)	2 30	6 50	6 50	7 50
" Catskill	3 16	7 36	7 36	8 45
" Albany (Union Sta. D. & H. C. RR.)	4 30	8 50	8 50	10 10 P.M.
" Saratoga	6 15	10 00 P.M.	10 00 P.M.	12 48 A.M.
" Caldwell (Lake George)	8 00 P.M.	.....	.....	.....

ELEGANT PULLMAN PARLOR CARS attached to Philadelphia Express No. 53, running through without change from Long Branch and New York to Saratoga.

MAGNIFICENT PARLOR CARS attached to No. 55, running through without change from Washington to Saratoga via Baltimore, Philadelphia, and New York.

GOING SOUTH.

STATIONS.	56 Albany Express.	58 Saratoga Express.	60 Phila. Express.
L've CALDWELL (Lake George)	.....	6 25 A.M.	11 10 A.M.
" SARATOGA, D. & H. C. RR.	7 00 A.M	8 00	1 50 P.M.
" ALBANY	8 40	9 50	2 30
Arr. Catskill (Catskill Mountains)	10 08	11 05	f 3 43
" Kingston (Catskill Mountains)	11 00	11 50	4 28
" West Point	12 28 P.M.	f 1 14 P.M.	f 5 53
" Cranston's	12 30	f 1 15	f 5 54
" JERSEY CITY, Union Station	2 20	2 50	7 30
" NEW YORK, Desbrosses St.	2 30	3 00	7 40
" NEW YORK, Cortlandt St.	2 30	3 00	7 40
" BROOKLYN, foot Fulton St.	2 40 P.M.	3 10	7 50
" LONG BRANCH, Penn. RR.	.....	4 47	9 55
" PHILADELPHIA, Penn RR.	.....	5 30	10 46 P.M.
" BALTIMORE, Penn. RR.	.....	9 00	.....
Arr. WASHINGTON, Penn. RR.	.....	10 15 P.M.	.....

All trains daily, except Sunday.

ELEGANT PULLMAN PARLOR CARS attached to Saratoga Express No. 58, running through without change from Saratoga to Washington via New York, Philadelphia, and Baltimore.

MAGNIFICENT PARLOR CARS attached to Philadelphia Express No. 60, running through without change to Long Branch via New York.

For further information call on nearest Agent, or address
HENRY MONETT, General Passenger Agent,
No. 24 State Street, New York.

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